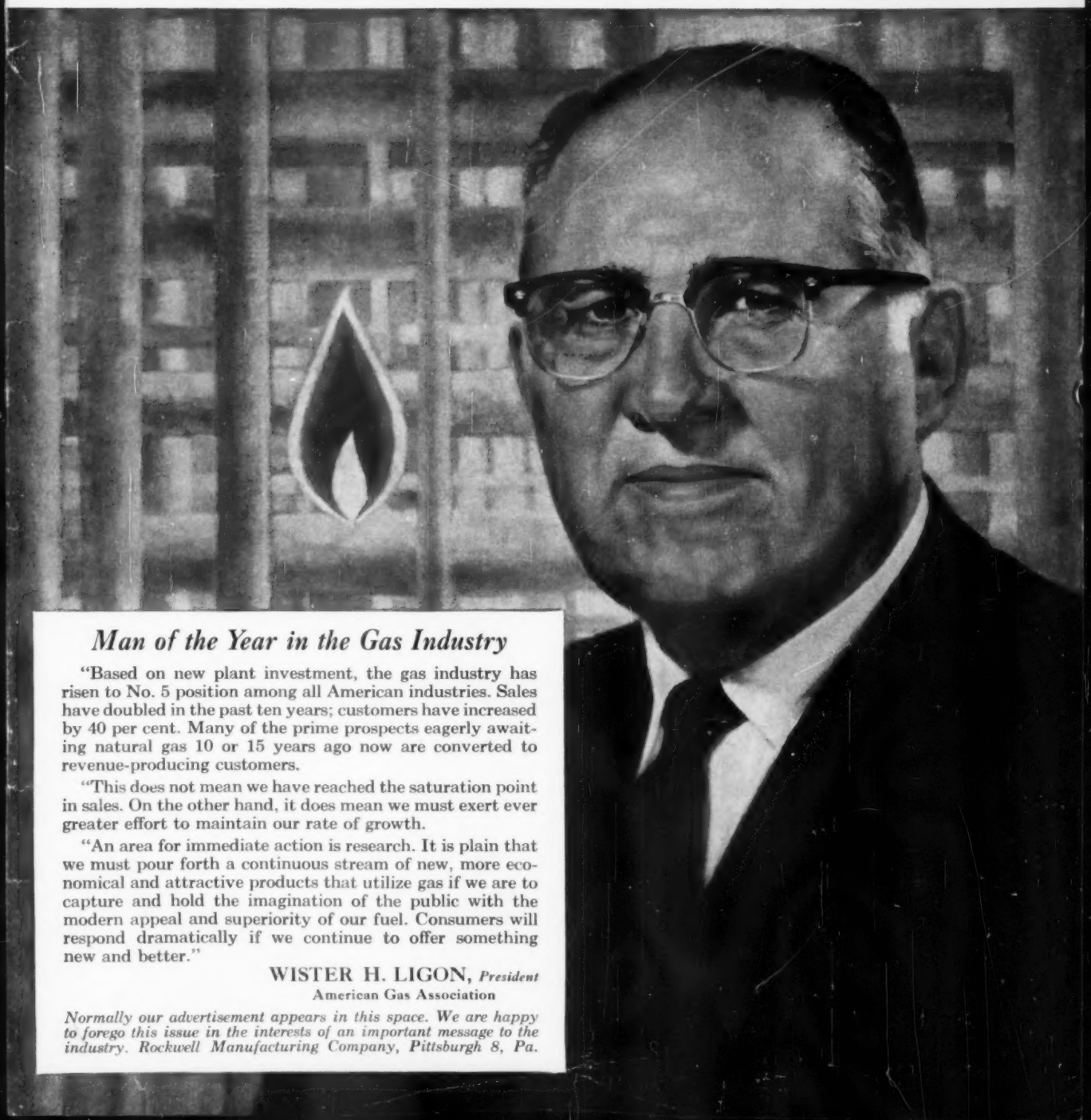
GAS

JANUARY 1960

Management development

A CHILTON PUBLICATION

THE NATION'S NATURAL GAS AUTHORITY



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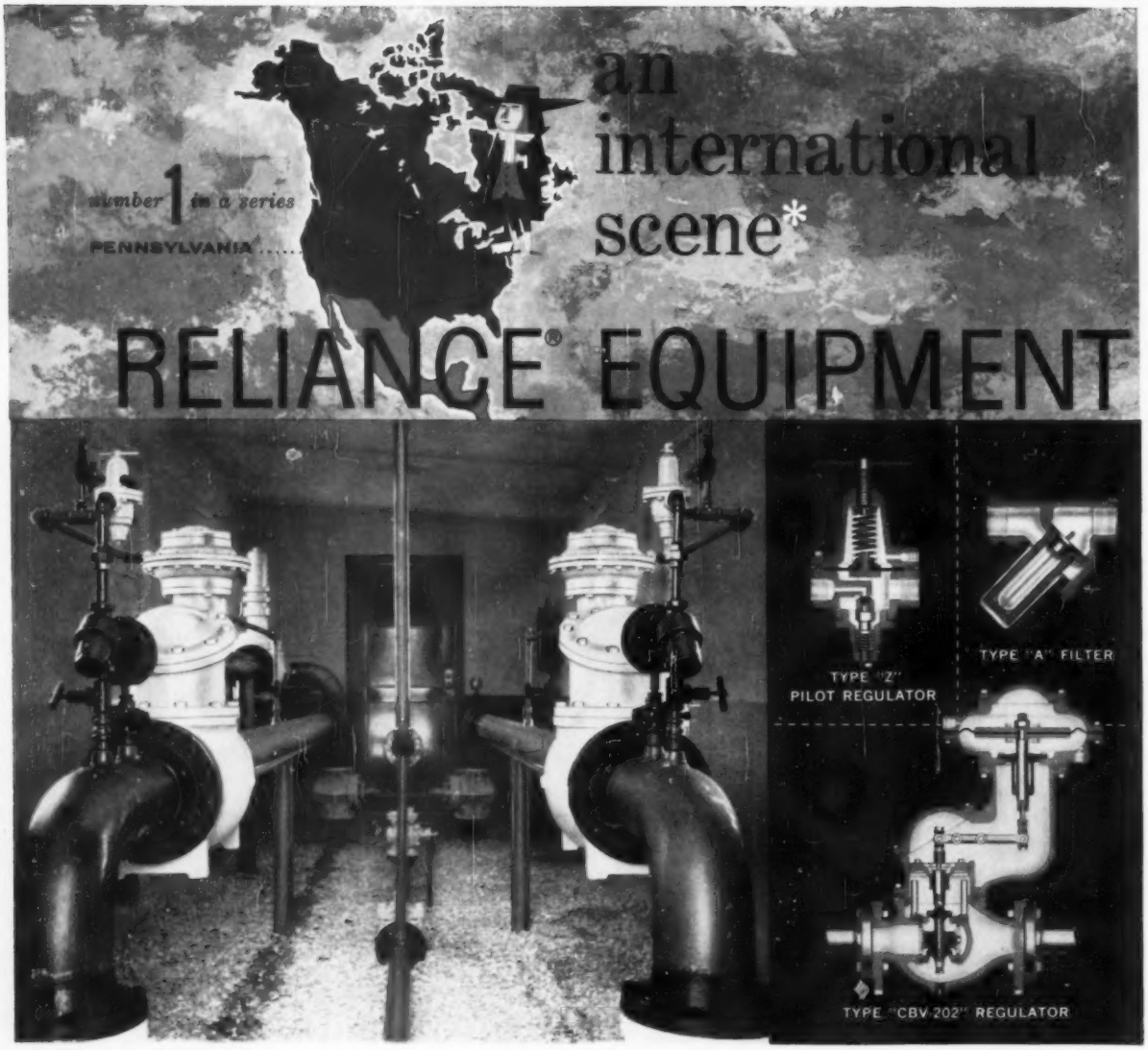
"Based on new plant investment, the gas industry has risen to No. 5 position among all American industries. Sales have doubled in the past ten years; customers have increased by 40 per cent. Many of the prime prospects eagerly awaiting natural gas 10 or 15 years ago now are converted to revenue-producing customers.

"This does not mean we have reached the saturation point in sales. On the other hand, it does mean we must exert ever greater effort to maintain our rate of growth.

"An area for immediate action is research. It is plain that we must pour forth a continuous stream of new, more economical and attractive products that utilize gas if we are to capture and hold the imagination of the public with the modern appeal and superiority of our fuel. Consumers will respond dramatically if we continue to offer something new and better."

WISTER H. LIGON, *President*
American Gas Association

Normally our advertisement appears in this space. We are happy to forego this issue in the interests of an important message to the industry. Rockwell Manufacturing Company, Pittsburgh 8, Pa.



One of many compact, safe and reliable gas control installations

Incorporated are RELIANCE® Type "CBV-202" High Pressure, Offset Connected, Pilot Loaded Reducing Regulators; Type "Z" High Pressure Pilot Regulators, and Type "A" Filters. ■ Type "CBV-202" Regulators are available in 2 to 12-inch sizes for inlet pressures to 1000 psi. Outlet pressures from 1 to 300 psi. The offset chamber provides accessibility to the valve cage unit without disturbing the upper structure of the regulator. It is also possible to change diaphragm heads from high to low pressures. By replacing the rocker arm shaft for low pressure, diaphragm power ratio changes from 1 to 1 to 3.4 to 1. ■ Type "Z" Pilot Regulators operate to 1000 psi inlet pressure. Outlet pressures from 2 to 300 psi. Available in ¼, ⅜ and ½-inch sizes. ■ Type "A" Filters will handle pressures to 1000 psi.

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General Sales Offices in principal cities in the United States and Canada

AMERICAN AMERICAN METER CO MEASUREMENT ENGINEERS **RELIANCE**

GAS

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36TH YEAR OF PUBLICATION

VOLUME THIRTY-SIX • NUMBER 1

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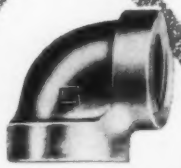

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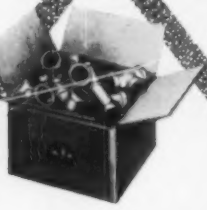

Malleable Fittings, Package-Protected, Cost Less to Handle, Stock, and Use

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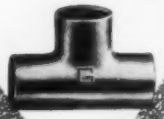

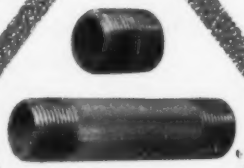

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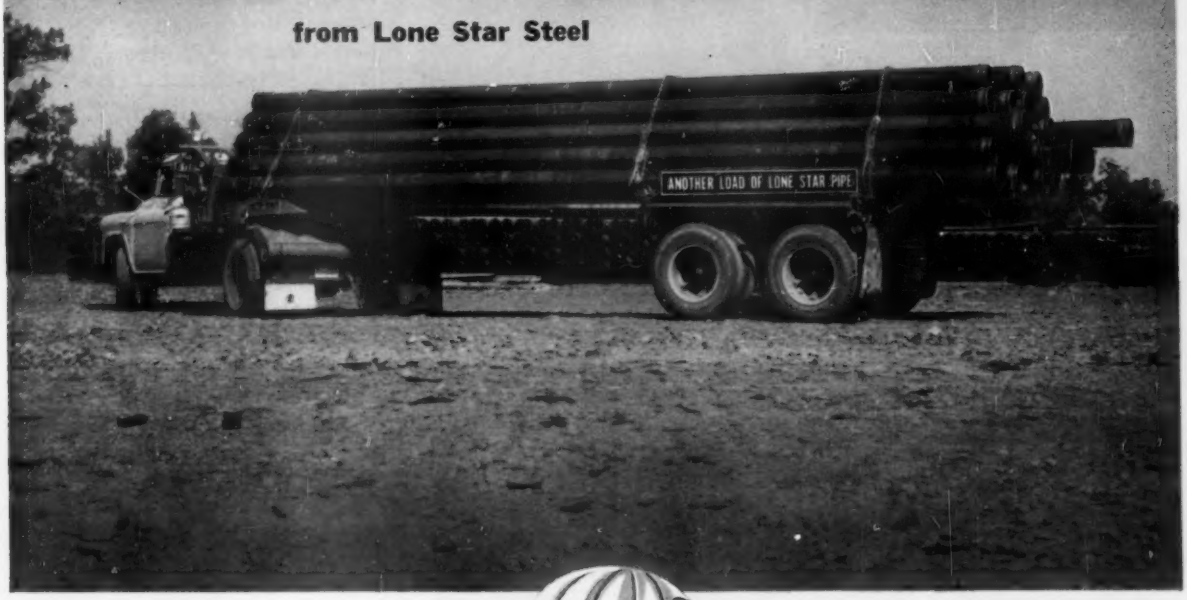
an example of the tough, API quality pipe Joe Roughneck expects..and gets.. from Lone Star Steel



In the heart of the oil country, Lone Star Steel's huge plant is Joe Roughneck's solid source of supply for API casing, tubing and line pipe. Quality-controlled from mining of ore to finished pipe.. Lone Star electric weld pipe meets strict API specifications. Fully normalized, of course.

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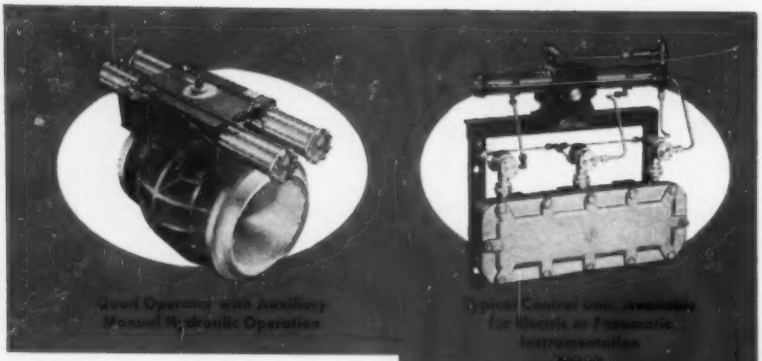

Quad Operator with Auxiliary Manual Hydraulic Operation

Typical Control unit, available for Electric or Pneumatic Instrumentation

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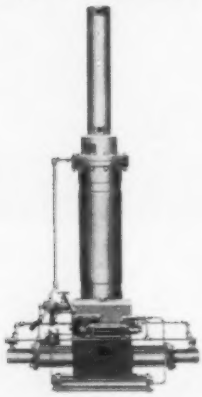
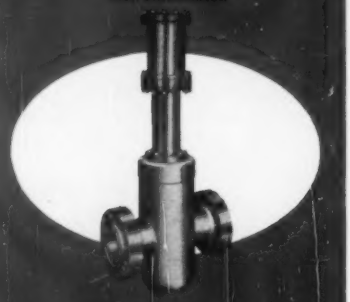
VALVE OPERATORS and CONTROLS
FOR THE GAS INDUSTRY

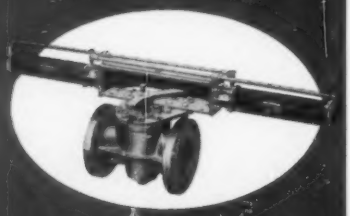


Main Line Gate Valve Operator and Controls

Whether you require automatic operation for gate valves or plug valves—1" to 36"—write or call Ledeen—manufacturers of one of the most complete lines of valve operators and controls available to the gas industry. Ask for engineered recommendations for your requirements.



High Pressure Gate Valve Operator



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GREATER SAFETY • FEWER REPLACEMENTS

ENGINEERED—TESTED—PERFORMANCE-PROVED

for gas service

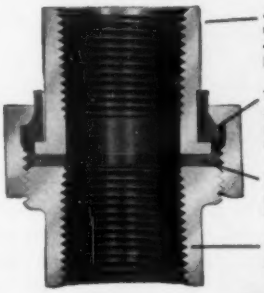
Each year, more corrosion engineers specify CAP Insulating Unions for their meter installations. These are necessary to assure maximum service from pipe and equipment. Insulating unions prevent corrosion caused by electrolysis.

Both the Capitol *Special* and *High Temperature* insulating unions are engineered specifically for gas service—performance-proved by years of service without a single failure—tested for assured quality control.

The *Special* insulating union is recommended for normal applications and will withstand up to 250° F (external heat). The *High Temperature* insulating union will withstand 450° F for one hour (the temperature at which solder in the meter will melt). The *High Temperature* union is designed for maximum protection against a gas leak in the event of a fire.

Only CAP gas service insulating unions have all of these features:

- Forged Steel construction—eliminates danger of sand holes or porosity.
- Exclusive Heavy Tapered Insulation—make connections 3-times stronger than light square type.
- Color Coded—for easy identification by service crews . . . orange for *Special* . . . yellow for *High Temperature*.
- Black oxide coated to prevent rusting.
- Two-thirds insulating unions, *Special* and *High Temperature* are available.


ALL FORGED STEEL for maximum tensile strength — no porosity — no sand holes.
TAPERED INSULATION assures 3-times stronger connections than light square type.
INSULATING is tested and proved effective, long-lasting.
NATIONAL PIPE TAPER for tighter joints.

Add to the life of your company's piping and meters by using CAP Insulating Unions on all installations.

CAP *Special* and *High Temperature* Insulating Unions

Size	Overall Dimensions	Special Part No.	High Temp. Part No.	Quantity in Carton	Approx. wt. per 100
¾″	2.27″	GS-33	GHT-3	20	72#
1″	2.89″	GS-44	GHT-4	12	110#
1¼″	2.96″	GS-55	GHT-5	10	150#
1½″	3.07″	GS-66	GHT-6	5	220#
2″	3.48″	GS-77	GHT-7	5	340#

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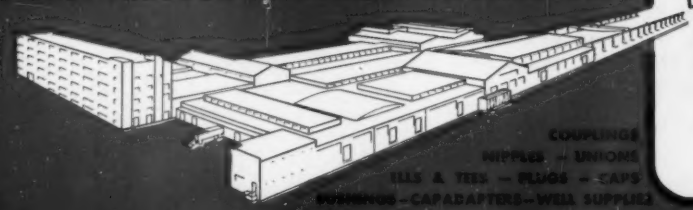


CAP **CAPITOL**

MANUFACTURING CO.

DIVISION OF HARSCO CORP.

COLUMBUS, OHIO

GAS

JANUARY, 1960

Thermally Thinking

THE natural gas "revolution" is not history. It is a current, pulsating event. What is past is prologue—or, you ain't seen nothing yet.

The key to any future success of the gas industry lies in the development of people into executives with top management capabilities. I submit that gas companies are failing miserably in developing latent managerial talents that rest untouched in some of their present employees. And such development is badly needed now. It will be critically needed in a few years.

Many gas companies have "exploded" under the dominant influence of one man or a small group of individuals. These are strong men with fantastic foresight, drive, ambition and talent. The gas industry can be very proud of them. However, one human being or even a small group of highly centralized executives cannot indefinitely continue to make all decisions for a gas company in a growing, diversifying gas industry with an infinitely complex business atmosphere. If nothing more demands management development, the crisis that often occurs with death or retirement of the strong leader(s) certainly does.

To develop broad-gauge executive capability in employees, a company has to start by hiring some people with potential. At best, this is a rough, tough, competitive thing to accomplish. But it can be done.

How is it done? Well, first a gas company has to prove to young, vital, idea-generating, dynamic people that creativity and initiative are patterns for success in the company—not longevity and conformity. Persons with future management ability and ambition are not stimulated by gas company security, automatic periodic advancement after minimal progress requirements are met, an all-encompassing retirement plan, etc. Oddly enough, rate of remuneration is not of prime importance to really outstanding talents—although I never heard of a good starting salary running anybody off.

Simply recruiting college degrees isn't the entire answer, either, as there are a lot of pretty helpless people running loose with even advanced degrees. Leadership potential, personality, judgment, and personal drive and ambition are, perhaps, at least as important.

Age does not seem to be a criterion. I have known an awful lot of gas company fellows, both old and young, with unlimited management ability, who have been sidetracked into routine positions—to put it kindly. Either their individuality or a failure of the company to evaluate their eventual managerial potential has led to the stagnation.

To be perfectly frank, it has been my observation that the gas industry has an affinity for concentrating advancement on mediocrity and conformity rather than brilliance and creativity. And isn't it amazing how many people you know who left nominal positions with one gas company to fairly leap ahead to executive positions in other gas companies or in other industries?

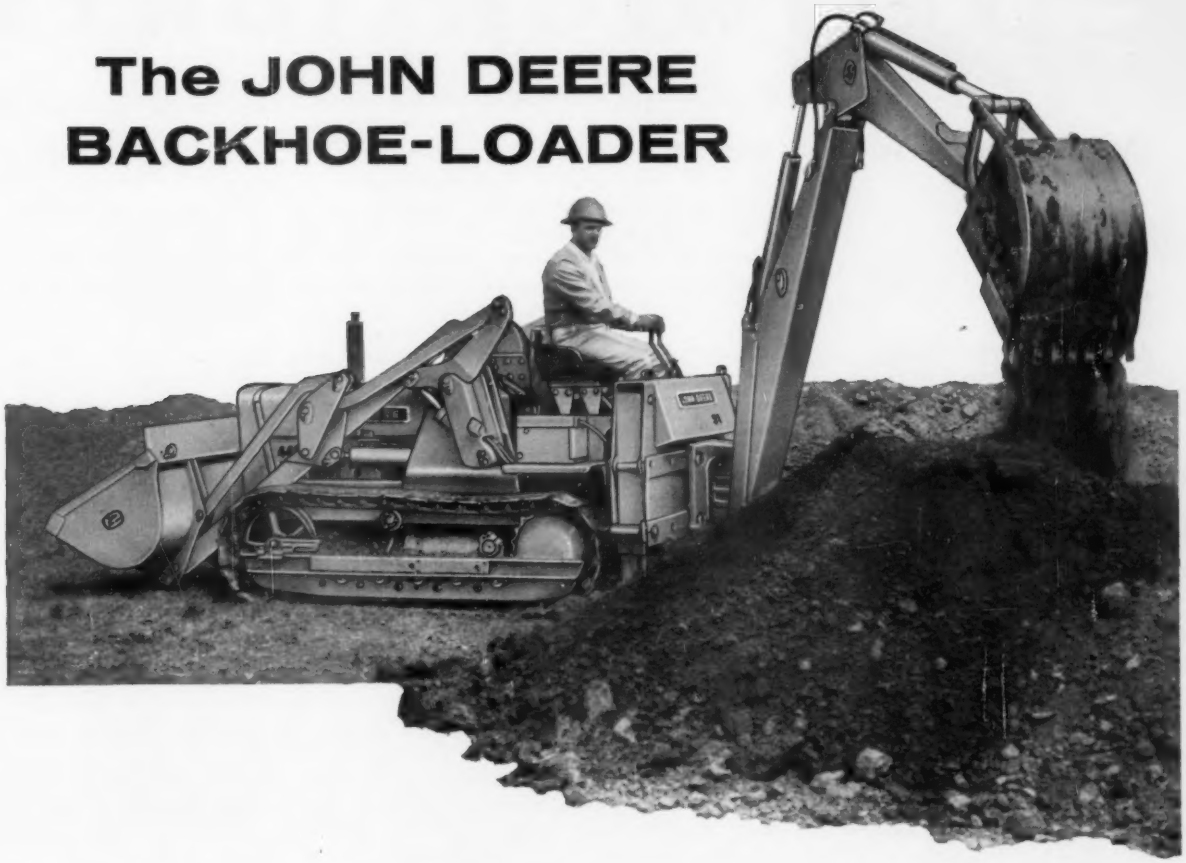
Practically, abundant company benefits are meaningful, and gas companies must continue to think of employee safety and health; but don't neglect minds and hearts that want respect of frank talk. And don't forget the challenge of participation in overcoming obstacles and the pride of being a member of the team. A gas company should plan for managerial development of its people with greater care than it plans for system and machines. This involves more than sending promising employees to some college short course. Their strengths and weaknesses must be appraised. On-the-job counseling by those with proven executive experience is vital. They must be given positions with responsibility early in their careers and motivated to operate at peak performance. A company environment that encourages maximum development of managerial skills is most important—the challenge and reward have to be there.

Only a personal realization that the need for management development among "junior" gas industry people is so critical, and the conviction that undeveloped potential is within gas company personnel today, could tempt me to cry aloud with Shakespeare's Hamlet: "The time is out of joint, O cursed spite, that ever I was born to set it right."

J. Fred Ebsen
EDITOR

Makes Old Cost Figures Obsolete...

The JOHN DEERE BACKHOE-LOADER



Here's the outfit that's cutting the high cost of excavating and trenching—giving many contractors and utilities a welcome break on construction expenses.

The 51 Backhoe combines fast, 2-lever digging with plenty of power and unusual flexibility. In minutes, one man on the job can set the boom-mounting to any of five positions from flush left to flush right, using only a wrench and the boom's own hydraulic power.

Self-leveling, the new 831 Loader gets the 7/8-yard heaped load into the truck fast—and with a minimum of effort. When the bucket is dumped from full height, it returns to digging angle by use of the *boom control only*. A 35-degree bucket roll-back provides 8500 pounds pry-out force for full loads.

For details, and a demonstration, see your John Deere Industrial Dealer. For specifications and illustrated literature, write the address below.

John Deere Industrial Division, Dept. 574, Moline, Ill.

The John Deere Credit Plan permits immediate ownership of the efficient equipment you need to cut costs now. All arrangements are made with the John Deere Industrial Dealer, in strict confidence.

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GAS HIGHLIGHTS

Weather adjuster rate

Arizona Public Service can try a "weather adjuster" rate for 6 months under an interim order from the State Corp. Commission. The proposed formula will have residential customers pay less for gas during weather colder than normal, and the rate will go up during a winter warmer than usual. ASCC also approved therm billing for domestic consumers—those in Phoenix have been on therms for some time. The state's supreme court will hear arguments on, but not stay, the commission's order.

LNG in caverns studied

Mined caverns for underground liquefied natural gas storage are being considered in Great Britain. While of prime interest to fuel-short nations overseas, gas distributors on both coasts are watching with more than passing interest.

El Paso — PNW blend gets initial O.K.

FPC presiding examiner Kelly recommended that the proposed merger of El Paso Natural Gas Co. and Pacific Northwest Pipeline Co. be approved by the commission. He said the move does not destroy competition in the California market or for production in the San Juan Basin. It equates El Paso's expanding markets with gas supplies and reserves in the Rocky Mountains and—more important—in Canada. It is said that PNW will become the Pacific Northwest Division of El Paso.

Gas-lighted signs

Has Arkla done it again? Their researchers have come up with another gas "appliance" that may move into the electric industry's exclusive market. "GASIGNS" (a proposed name) will be unbreakable glass (almost) with gas-produced illumination distributed over the entire sign surface. One sign is blazing away at Arkansas Louisiana Gas Co.'s offices in Shreveport. Others due for their district offices and the Stephens Bldg. in Little Rock. Several hundred have been ordered by a gas appliance manufacturer. Some can blink on and off, too.

Study at home with SGA

A project of the Distribution Section, Southern Gas Association, will come to fruition Jan. 1 when a "Home Study Course in Natural Gas Distribution" will be available. The course, first of its kind in print, was written by a staff member of Texas College of Arts & Industries. Enrollment will be through SGA, with administration by Texas A & I. Kudos, SGA.

Steel still short

Availability of steel for many users in early 1960 depends on whether automakers can reach their ambitious production goals, says The IRON AGE, one of GAS' sister Chilton publications. The automotive demand will keep the market vise-tight for cold and hot-rolled sheets and other shapes. Also, shortage of rail cars and orders for new freight cars aren't going to help the situation. Mill shipments are still gaining ground and were close to 8 million tons in December. Domestic gas range manufacturers first felt the pinch in Oct., '59.

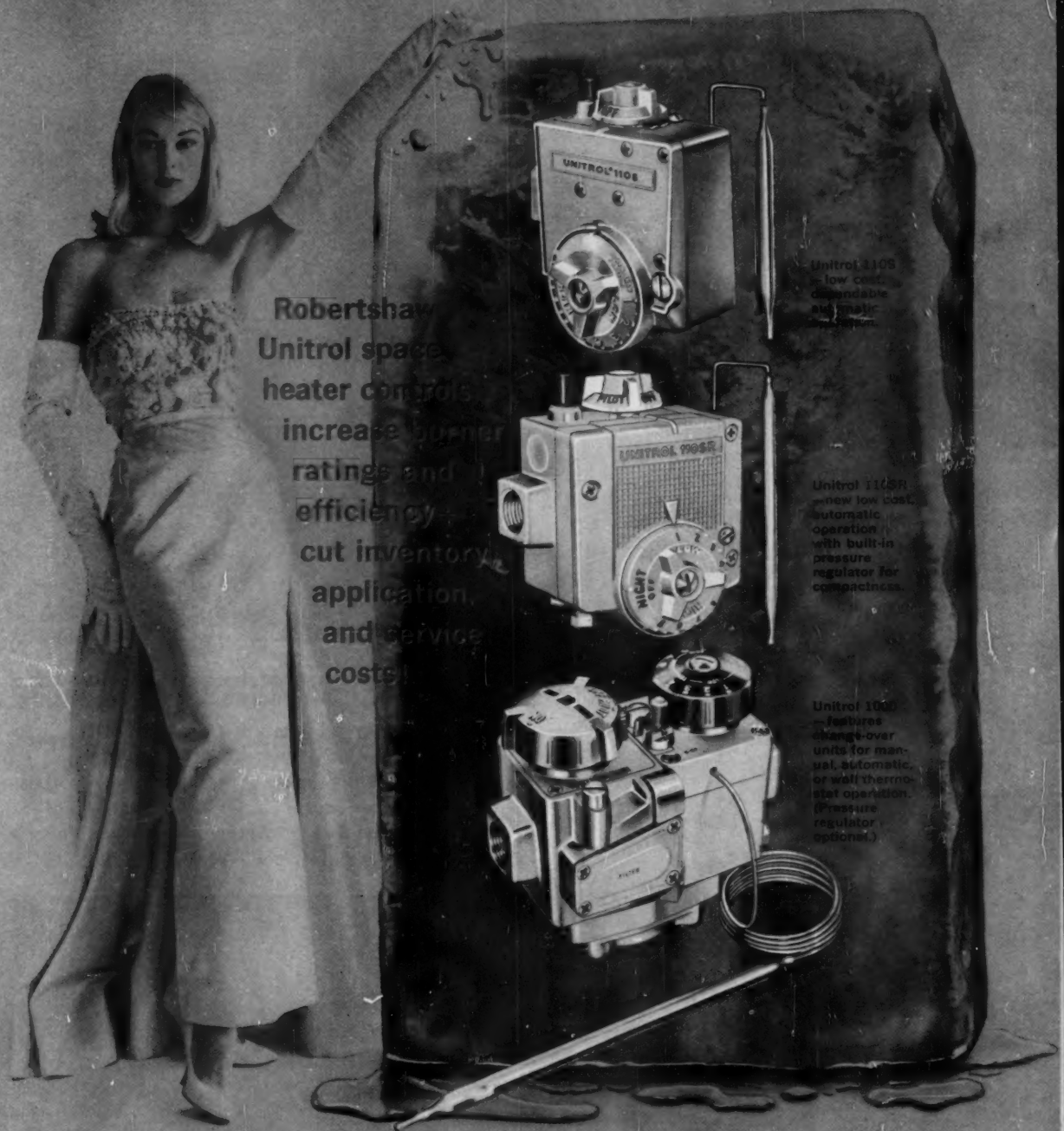
Depletion allowance

Richard J. Gonzalez, Humble Oil, told the House (Ways and Means) that since producers risk about $5 billion per year to develop new supplies of gas and oil, and increasing supplies of these energy sources are essential for economic progress and national security, that percentage depletion has been a key factor in America's economic life and any tampering with this tax provision could undermine the energy base upon which the nation's future growth and security depend. P. S., percentage depletion didn't do badly at all before Ways & Means.

New kitchen queen

On Jan. 1, Mrs. Ellen Bridges became AGA's home service activities bureau head. She replaced Jessie McQueen, recently retired after 30 years of service. Mrs. Bridges has been home service director for The Gas Service Co., Pittsburg, Kansas, since 1944.

thaw extra profits out of ROBERTSHAW dependability!



Robertshaw Unitrol space heater controls increase burner ratings and efficiency, cut inventory, application and service costs!

Unitrol 110S —low cost, dependable automatic operation.

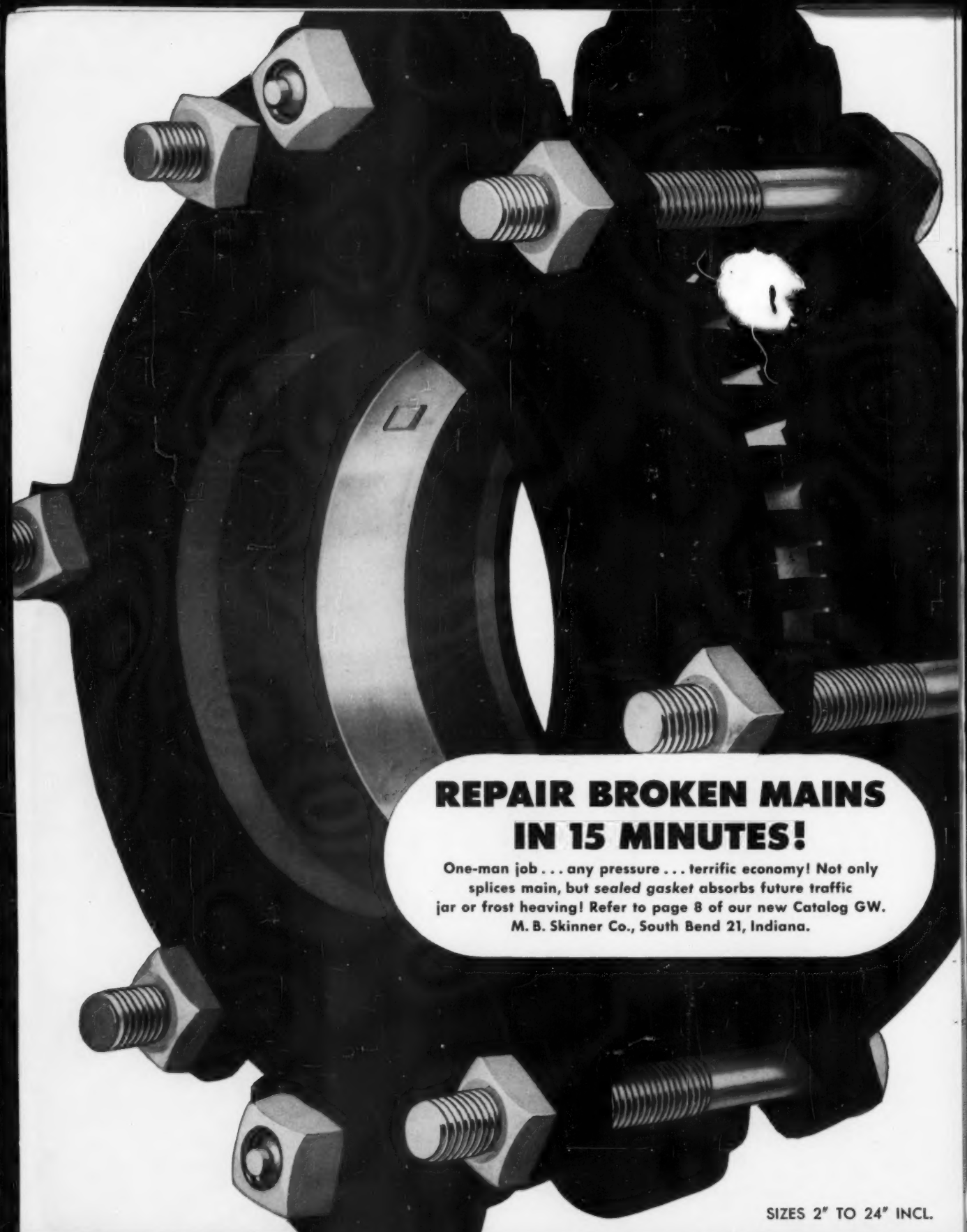
Unitrol 110SR —new low cost, automatic operation with built-in pressure regulator for compactness.

Unitrol 1000 —features change-over units for manual, automatic, or wall thermostat operation. (Pressure regulator optional.)

The surest way to thaw extra profit out of space heater appliances is to specify controls that operate dependably to safeguard your product reputation and cut service costs. The Robertshaw Unitrol 110S provides dependable, low cost return air sensing element operation. The new Unitrol 110SR combines the economy and dependability of the 110S with the increased burner efficiency provided by a built-in pressure regulator—*plus compactness!* The Unitrol 1000 provides inventory-saving change-over units for manual, automatic, and wall thermostat operation.

Inquire today . . .
contact

Robertshaw
CONTROLS COMPANY
SEAYSON CONTROLS DIVISION, LONG BEACH, CALIF.



REPAIR BROKEN MAINS IN 15 MINUTES!

One-man job . . . any pressure . . . terrific economy! Not only splices main, but *sealed gasket* absorbs future traffic jar or frost heaving! Refer to page 8 of our new Catalog GW. M. B. Skinner Co., South Bend 21, Indiana.

SIZES 2" TO 24" INCL.

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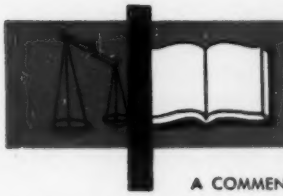

Regulatory and Legislative Trends

A COMMENTARY ON NATIONAL AND STATE DEVELOPMENTS BY AN EXPERT IN UTILITY LAW

Producers' puzzle can be solved

THE problem of regulating the prices charged by independent natural gas producers was created in 1954 by the Supreme Court's decision in the Phillips Petroleum Co. case. FPC was told by the Court to regulate the price of natural gas sold by producers in interstate commerce for resale for ultimate public use. FPC has not reached a definite solution to this puzzling problem yet, but hope can be derived from a recent address by Commissioner Stueck to the Independent Natural Gas Association. The importance of the solution to this national puzzle is apparent from the more than 1800 suspended producer rate cases seeking total permanent annual price increases of $120 million. The problem of regulating gas producers is more baffling than those existing in the interstate pipeline or local distribution segments of the gas industry.

• Regulating an irreplaceable natural resource

Commissioner Stueck analyzed the unique position of natural gas in our economy. He said: "The prices of other basic natural resources, copper, silver or gold, are regulated either by mandates from the government or by the competitive impact of world prices. Natural gas cannot be exported to or imported from any country other than Canada or Mexico, our neighbors, so world trade competition has no real effect even though some few shipments of liquefied methane have been transported to Europe.

"The prices of competing fuels, coal and oil, are not regulated. Prices of natural gas, regulated or even unregulated, are, as of this date, lower than those of coal or oil in nearly every part of the country. But the fact is that in many parts of the country natural gas is reaching an economic ceiling right now!"

Even though 32 million residential customers use gas now and 12 million more are expected to be added by 1970, off-peak sales to industry are essential to keep residential prices reasonable. Gas must be priced to sell below the equivalent price of oil and coal to capture the necessary industrial business.

• The price to be paid by pipelines to producers

Commissioner Stueck sees a new era in which interstate pipelines cannot pay just any price asked by producers, and then expect to pass that increase in gas costs along to the customers. He asserted: "It is a self-evident fact that the pipeliner is now, has been, and will continue to be in the middle—between the 'devil' of the gas producer and the 'deep blue sea' of the distributor. Accordingly, one of the matters that must be of pre-eminent concern to him is how to continue into the future the growth he has experienced in the past 15 postwar years. Natural gas pipelines now stretch from one end of our land to the other—from the shores of the Gulf of Mexico to the North Atlantic and from Texas to California and to Florida . . ."

"The self-evident facts are that he must expand *within* the areas he now serves. He and his partner, the distributor, must meet the competition of other fuels by finding higher uses for gas in industry, by finding more and larger storage areas nearer the markets to be served, by making a tremendous and united effort to mass produce units which will heat and cool houses throughout the entire year, by learning the facts from the City of Dallas, Texas, where, I am told, there are more than 50 installations of units of 10,000 tons capacity and up, capable of heating and cooling large buildings with a maximum of efficiency, a minimum of maintenance and at a competitive price of construction. The cold, hard, self-evident fact is that the pipeliner cannot pay *just any* price asked by a producer with the expectation of passing it along to the distributor and ultimate consumer."

• Testing producer prices

Like other businessmen, gas producers have sought every tax benefit and the highest available price for their commodity. They will have to become concerned, however, with pricing gas out of the desirable industrial market.

Congress has delegated to FPC the task of implementing declared public policy in connection with the natural gas business. The means of accomplishing that policy are left to the administrative expertness of FPC. The commission has discretion to use appropriate methods to regulate producers' gas prices in the public interest.

FPC knows that the cost of producing natural gas, much of which is produced in conjunction with oil, has no consistent relationship to the value of gas. FPC can use cost of service as a point of departure dictated by the Court of Appeals in the City of Detroit case, but it is developing better and more practicable tests. Commissioner Stueck named 20 facts which have a bearing on the worth of producers' gas, exclusive of a cost of service measure. They are:

1. Depth of wells. The deeper the wells, the more expensive the

gas. Depth is recognized in the case of oil where oil produced from deeper wells is given greater allowables.

2. Is the gas produced on dry land, or marsh land, or off-shore? For the same depth of wells and the same volume of gas, the wetter the surface, apparently the more expensive the operation. As in the case of depth of wells, this factor is also recognized when setting up allowables for oil.

3. Distance of the wells (field or production) from (1) the pipeline, and (2) the ultimate market. If the wells are at great distance from the pipeline, the gas apparently is not worth as much as that adjacent to the pipeline. Likewise, the farther away the well is from the ultimate market, the less valuable.

4. It must be recognized that the costs of producing gas have risen sharply in recent years. This would be reflected in a "cost" determination, but the facts seem to be that most gas is not purchased on the basis of cost determination alone, although the buyer has to recognize these factors when comparing past prices with prices being offered:

(a) *Cost of exploration* is increasing, especially in face of poor structure prospects. The more expensive methods of exploring for gas are increasingly used.

(b) *Costs of obtaining leases* are going up as a matter of fact. Even though the increased value isn't there, the sellers of leases are considerably influenced by rising prices and their asking prices are continually increasing. I am informed that in many cases royalties are requested on the basis of one-sixth, as distinguished from the old standard one-eighth or smaller fractions which used to control.

(c) *Drilling costs* have risen sharply. The cost of materials as well as labor is up.

(d) *Operating costs* are rising in many cases because of poor wells and fewer wells per field.

5. Competition. The price offered for gas is influenced considerably by the number of sellers in the field and the number of buyers. This is a matter of supply and demand.

6. Historical considerations. In many cases, for no logical reason, it is a fact that prices are sometimes governed by historical price levels. These historical price levels are usually connected with a region and/or a district, such as the railroad districts in Texas. The wider regional areas such as west Texas, south Louisiana, etc., are examples of regions where historical prices have an influence.

7. Term of agreement. The longer the contract term, the more valuable it appears to be to the buyer.

8. Ratio of daily contract quantity (DCQ) to reserves. From the standpoint of the seller, there appears to be a desire for a faster payout. From the standpoint of the buyer, this tendency gives a lower life index.

9. Quality. Obviously, a higher Btu gas or a gas with less carbon dioxide, sulfur, etc., is more valuable to the buyer. Likewise, the presence or absence of hydrocarbons has a great bearing on price.

10. Price terms. The buyer also seeks contracts which do not include favored nations clauses or price redetermination clauses. The firmest price for the longest period is most desirable to the buyer.

11. Take-or-pay-for provisions. A lower take-or-pay-for clause is worth much to the buyer.

12. Operating swings. It seems to be a fact that gas is more valuable to a buyer where the contract permits larger permissible operating swings.

13. Taxes. Provisions with respect to reimbursement for taxes or the inclusion of taxes within the price is important.

14. Delivery pressure. The provisions for delivery pressure in the contract and the way it will probably work out in the particular field is of significance in fixing the price for the gas.

15. Spot or short-term purchases. Unless such purchases are adequately backed up with dedicated reserves, this type of contract is certainly of much less value to the buyer than the long-term contract.

16. Proven reserves. If the gas reserves dedicated under the contract are production proven reserves, they are considerably more valuable than those reserves determined by such methods as core evaluations, etc.

17. Delivery in field. Delivery at a central point in a field is an advantage to the buyer over deliveries at the individual wellheads.

18. Recycled gas. Such gas reserves are more valuable because of the assurance of the reserves and known availability.

19. Competitive fuels. Unquestionably, the price of competitive fuels in the area of ultimate delivery must have a bearing upon the price offered for gas.

20. Total quantity of reserves available. Contrary to most purchases (where the greater the quantity, the lower the cost per unit), with natural gas, the greater the quantity, the higher the price.

True comparability between producer gas prices is a major hurdle that an objective analyst must take, but Commissioner Stueck thinks that FPC has acquired sufficient information to take a big step forward in solving the producer price puzzle. He thinks that FPC can ". . . reach tentative conclusions as to current and going prices in each known producing area and to arrive at 'ceiling prices' for 'old gas' and 'ceiling initial prices' for 'new gas.' Having found it possible to establish these prices, could the commission, then, with the approval of all segments of the industry and consumers generally, take forthright action for the future?

"Increased rates arrived at by arm's length contract with fixed escalations or even redetermination to a price at or under the ceiling could then be permitted without suspension. Those 'breaking' the ceiling would be suspended and proof required under Section 4 of the Natural Gas Act.

"Applications for new certificates involving initial prices at or under the 'initial price ceiling' could be granted temporary authority by letter immediately, and permanent authority without condition as quickly as processing could take

Continued on page 74

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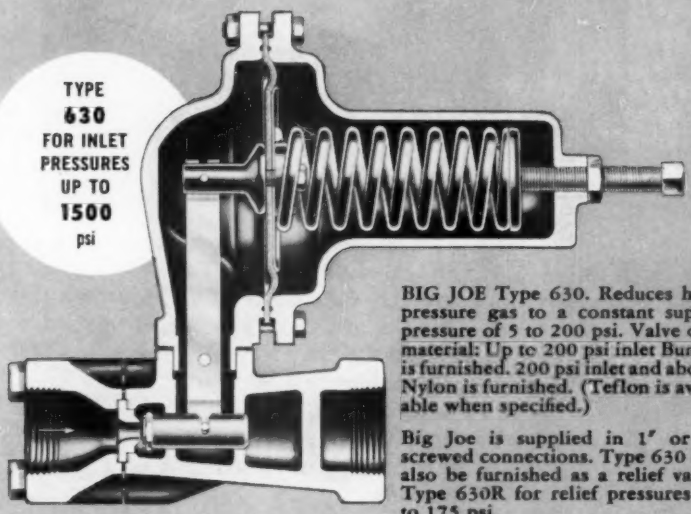
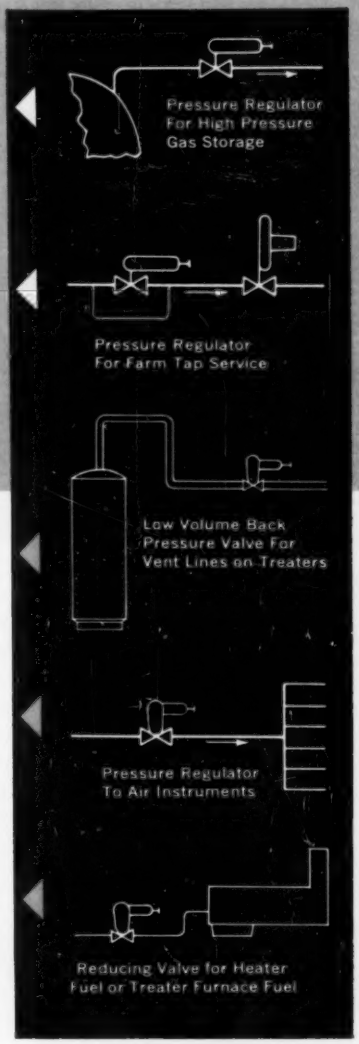


BIG JOE Type 630. Reduces high pressure gas to a constant supply pressure of 5 to 200 psi. Valve disc material: Up to 200 psi inlet BunaN is furnished. 200 psi inlet and above, Nylon is furnished. (Teflon is available when specified.)

Big Joe is supplied in 1″ or 2″ screwed connections. Type 630 can also be furnished as a relief valve, Type 630R for relief pressures up to 175 psi.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Pressure Regulator For Farm Tap Service
Low Volume Back Pressure Valve For Vent Lines on Treaters
Pressure Regulator To Air Instruments
Reducing Valve for Heater Fuel or Treater Furnace Fuel

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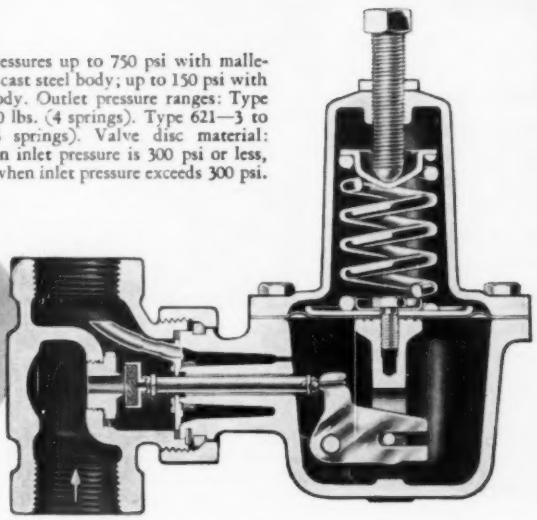
TYPE **620** FOR INLET PRESSURES UP TO **750** psi



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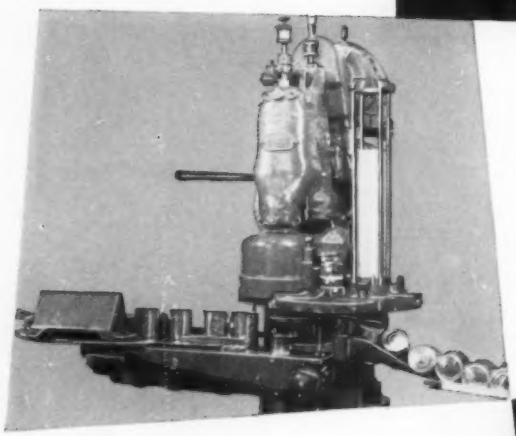

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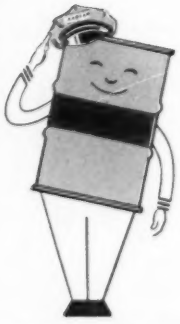

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TECHNICAL TRENDS

By GUY CORFIELD

Living with radiation

A 65-page booklet with the above title has recently been issued by the U. S. Atomic Energy Commission. Quoting from its Preface it "presents the essence of what has been found by extensive field experience to be a practical approach to the understanding of the industrial radiation hazard. It is intended for a layman who requires a basic understanding of the relationship of the radiation problem to his own field—because of its direct bearing on his own work or because he is an instructor of others" — and from its Introduction, "The atomic age promises many wonderful benefits for mankind. The use of atomic power, the use of radioactive materials as tracers in biology and in industry, the use of massive doses of radiation in the cure of malignant diseases, the use of radiation to kill off bacteria in food so that the food may be preserved longer, the use of the energy from radioactive material in certain chemical processes to bring about the development of new and useful products—all these things promise great benefits to mankind, yet one single fact makes it necessary for us to undertake our study. *Radioactive materials emit energy which has the power to damage living tissue.*"

This publication is actually a layman's text book on the technology and problems of the Atomic Age. In 11 chapters, two appendices and a bibliography, it outlines the benefits and hazards that have developed; the external (to the human body) radiation problem and protection from it; the internal (entering the human body) radiation problem and how to cope with it; the nature of contamination and means for de-contamination; instrumentation and measurement; simplified chemistry, physics and engineering of atomic fission; and definitions and terminology.

"Living With Radiation" can be obtained from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., at a cost of 45 cents. It is designated as Fundamentals, Part I, and states that sections of Part II will follow, applying to specific problems in fields of work such as fire, transportation, etc.

In the same vein, Dr. W. F. Libby, Professor of Chemistry, UCLA, and recently resigned scientist member of the AEC, spoke last August in Los Angeles on "The Citizen and the Atom." Some of the statements were to the effect that:

We are deplorably negligent in Civil Defense. The mass of people are no better educated or prepared for coping with the after-effects of nuclear attack than were the Japanese sailors who were caught in the Pacific radioactive fallout. This is due to general public indifference, which in turn restrains Congress from appropriating adequate money for education, provision of public shelters, etc. The public can do nothing to protect themselves *from* the actual nuclear blast, but the blast will embrace only a relatively small area. The after-effects, from radiation, will be widespread and a mass killer in heavily populated areas. The AEC, with limited funds for the purpose, is doing what it can along three lines: (1) promoting public education and interest; (2) attempting persuasion of architects and builders to, in turn, persuade their clients to agree to provision of a building shelter (radioactive fallout decays rapidly, and protection for 48 hours in a below-ground or thick-walled concrete enclosure will be generally sufficient); and (3) advocating possession of a portable (transistor) radio for receiving civil defense instructions, and a simple instrument for measuring radiation. Dr. Libby demonstrated a device which can be incorporated in any radio, which automatically gives audible warning of the presence of dangerous radiation. He estimated that it could be mass produced for $15.

The population of the U. S. is increasing at a rate to double every 50 years. The overall world increase is at a rate to double every 100 years. Therefore we will be running short of energy in the foreseeable future and must develop inexhaustible sources. This will probably be accomplsihed by (1) utilizing the small percentage of uranium in granite rock, which gives each pound of rock the potential equivalent of a pound of coal and (2) "taming the hydrogen bomb," i.e., controlling the power of hydrogen fusion to non-war uses, probably by transformation of the "heavy hydrogen" in "heavy water" existing in small percentage but enormous quantities in the oceans.

Atomic power for heat, electricity, etc., is now competitive with and even ahead of conventional fuels for hard-to-get-at installations such as in polar regions, deserts, etc. In the U. S., for large power plants, nuclear energy-generated electricity now costs about 12 mils per KWH or about double the average cost of generation by fossil fuels. In about 10 years the cost will be equalized in areas of highest price fossil fuels.

An undeveloped field which can potentially improve every line of human endeavor, and save hundreds of millions of dollars in the U. S. alone, is the use of radioactive isotopes which are by-products of nuclear reactors. Examples of present application are in medicine, industry and agriculture, but even in these fields the surface is hardly scratched. The extended use of these isotopes promises to largely solve the problem of disposal of radioactive wastes because these wastes actually contain the isotopes.

The rapid development of *new* knowledge in almost every area, but particularly in chemistry and physics, and the need for *better* basic education of future generations *plus* imparting to them this new knowledge, and the rapid population increase, is already having impact on our educational system and will soon impose a fantastic burden on it.

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WASHINGTON

By NEIL REGEIMBAL
GAS Washington Bureau

Rough, tough political year ahead

CONGRESS comes back to Washington this month armed with briefcases bulging with word from the home folks and loaded for political bear. It's expected to be one of the roughest, toughest, political years in recent history.

By the end of 1960, voters will have elected a new President, Vice President, all members of the House, one-third of the Senate, and thousands of state, county, and local officials. These are the plums for which politicians will be fighting tooth-and-nail during the next 11 months.

First to be settled are the intra-party fights of both Republicans and Democrats over who the candidates for the top jobs will be. All during this fight, of course, the battle between the two parties for support of voters will be underway too. Control of Congress by one party, and of the White House by the opposition, will sharpen these battles. Thus, all issues will be weighed by their potential political appeal, not their simple merits.

Against this background, the gas industry, and business generally, will have to tread lightly as it wends its way between the political pitfalls. The industry has fallen into political traps before, but this year the dangers are many times increased.

Natural gas legislation is particularly vulnerable to the super-political atmosphere already thickening in the nation's capital. So far, various leaders have urged a new effort to win congressional support for the measure now pending in the House, but they have all insisted that "you fellers" have got to get together and work. This has been variously applied to the three segments of the gas industry, to the gas industry and the coal industry, to the Republicans and Democrats, and to the various organizations representing these industries.

It's been applied by the Eisenhower Administration (Secretary Seaton), by the Democratic sponsor, Rep. Oren Harris (D., Ark.), and by industry spokesmen as well.

Everyone is for the legislation, but everyone wants someone else to get together before they begin to work.

There has been some behind-the-scenes work by some groups and some individuals, but the indication is that it won't be pushed into the light of day until all these "other interests" have worked out their disagreements.

Reports are that several large industry groups have been working individually to draft either a mutually acceptable bill to replace the pigeonholed Harris measure, or to draft a substitute which would be more heavily endorsed by the gas industry.

The timidity of the gas-bill seekers to go all-out this year is understandable. It is probably wise.

Especially in as volatile a political year as 1960 is certain to be, gas legislation needs more than normally skillful political and public relations tacticians behind it. The bill certainly still carries a "consumer gouge" label pinned and held on by opponents for many years. It's no easy task to undo the harm such a label carries. It's particularly hard in a year such as 1960.

But the chances of passing this legislation in 1960, or in any year now, will require imaginative, skillful, and careful economic education for the voting and gas consuming public. This would be more than a Madison Avenue advertising blitz, although advertising would have to be a part.

As things stand on the eve of the reopening of Congress, it is unlikely that the Harris gas bill will be pushed. Rep. Harris has made it clear he will not ask the House Rules Committee (which now holds the bill and controls which measures come to a vote on the floor) to take the gas bill out of its slot for a vote unless there is active backing from the White House, and solid support from the industry.

To bring the measure up without such all-out backing would again open the industry to bitter, searing attacks of politicians. Even with this support, but without the understanding of voters and consumers of the importance of the measure to future gas supplies and prices, the bill might well open the industry to political attack.

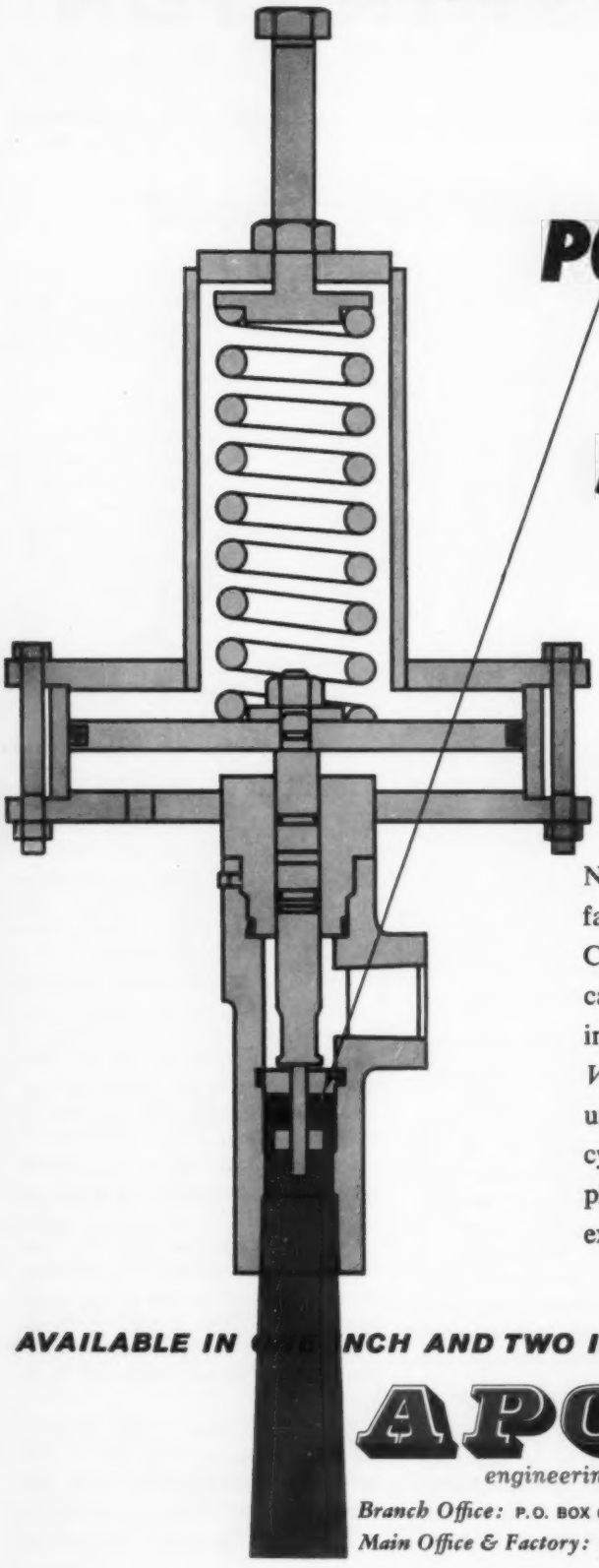
In the apparent absence of legislation to clear the gas control air, there are indications of serious attempts by the Federal Power Commission to finally develop some system of making present control requirements work.

There is an active movement within FPC to develop and use an area price policy, although support of the five commissioners was not unanimous as to how the system would be set up as the end of year approached. Big stumbling block was still how costs would be handled in light of various court decisions.

Under the area pricing plan, a ceiling recognizing prevailing prices would be set, and prices for new or old gas would be permitted

Continued on page 74

Here's a liquid dump valve with...



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By MARSHALL E. PARKER

Routine rectifier inspections

EVERY operating rectifier in a cathodic protection system should be the object of periodic inspection. The period may be as short as once a week, or as long as three months; one month is probably the best compromise between excessive cost and inadequate inspection. Even more important than the interval chosen, however, is consistency. This does not mean absolute uniformity, but it is important that the inspections be carried out faithfully and regularly. This is not a minor matter—it is of extreme importance. The fact that a failure does not make any noise, ring any bells, flash any lights, or in any other way make itself known adds emphasis to the statement that faithful, regular, and frequent inspections are of major importance.

Complete records should be kept of the results of these inspections; it will be very helpful if the quantitative data (current, voltage, power consumption, etc.) are plotted graphically as functions of time. This will make seasonal trends visible, as well as changes indicative of actual difficulties. There are a number of other things to be observed, however, in addition to the quantitative readings; in order to get the maxium results from the inspection, a systematic procedure should be followed.

(1) Before opening the case, look for any signs of damage or of tampering; observe the watt-hour meter—is it operating? Feel the case for warmth and listen for the low quiet hum of an operating rectifier.

(2) Open the door slowly and carefully; look out for snakes, spiders, bees, etc. Read the two meters, note the settings, and read the watt-hour meter; record. Look for any signs of damage or trouble.

(3) Turn the power off by means of the outside switch, so that the entire unit is completely dead. Immediately, before there is any chance for the unit to cool off, feel all of the stacks. They should all be warm, depending on the load; but, even more important, they should all be at about the same temperature. A cold stack is not working; but if there are two cold stacks, it may be that only one of them has actually failed.

(4) Working rapidly, before the unit has much time to cool off, feel all of the connections within reach. None of these should be hot, or even very warm. A hot connection usually means a loose or dirty one; the heat is generated by the resistance. Any warm connections should be tightened; if they prove to be already tight, they should be taken apart and cleaned, then retightened.

(5) Now a more leisurely inspection of the interior can be made. Look for any signs of arcs or burned areas from possible lightning surges. If the unit is equipped with fuses, check the supply of spares, both for number and for correct size. Check the operating fuse or fuses for correct size.

(6) Inspect the screens for stoppages by dust, bird nests, insects or insect nests, or other debris. Clean if needed.

(7) With the unit still off, check the watt-hour meter; the disc should be absolutely motionless, unless, of course, the same meter supplies something other than the rectifier. If the disc is moving, it may indicate a defective meter, or there may be a leakage path in the wiring. Check by turning the unit switch off also. If the meter is under suspicion of being defective, notify the power company.

(8) Check the two meters on the panel by comparing their readings with those of meters of higher accuracy. The voltmeter can be checked across the output terminals. The checking of the ammeter requires either the opening of the circuit, or the checking of the voltage across the shunt by a millivoltmeter.

(9) Examine the case for possible re-painting. Look over the whole installation, pole and mounting, guy wires and accessory equipment. Check warning signs. Inspect the entire length of cable run for washes or signs of construction activity which might threaten it.

After the rectifier is re-energized, it is a good idea to check the efficiency. This is the ratio of the dc output to the ac input, expressed usually as a percentage. The dc output, in watts, is the product of the current in amperes and the voltage in volts, both being measured by meters of the D'Arsonval type. These readings are those taken under step (8) above.

The ac input is determined from the watt-hour meter, by counting the number of revolutions of the disc in a known period of time, usually one minute. The following expression then gives the power input in watts

$$P = \frac{3600 \times N \times K}{T},$$

where P is the ac input power in watts, N is the number of disc revolutions counted, K is the meter constant (found on the face of the meter), and T is the length of the counting interval in seconds.

Following the definition of efficiency already given, it may then be computed from

Continued on page 75

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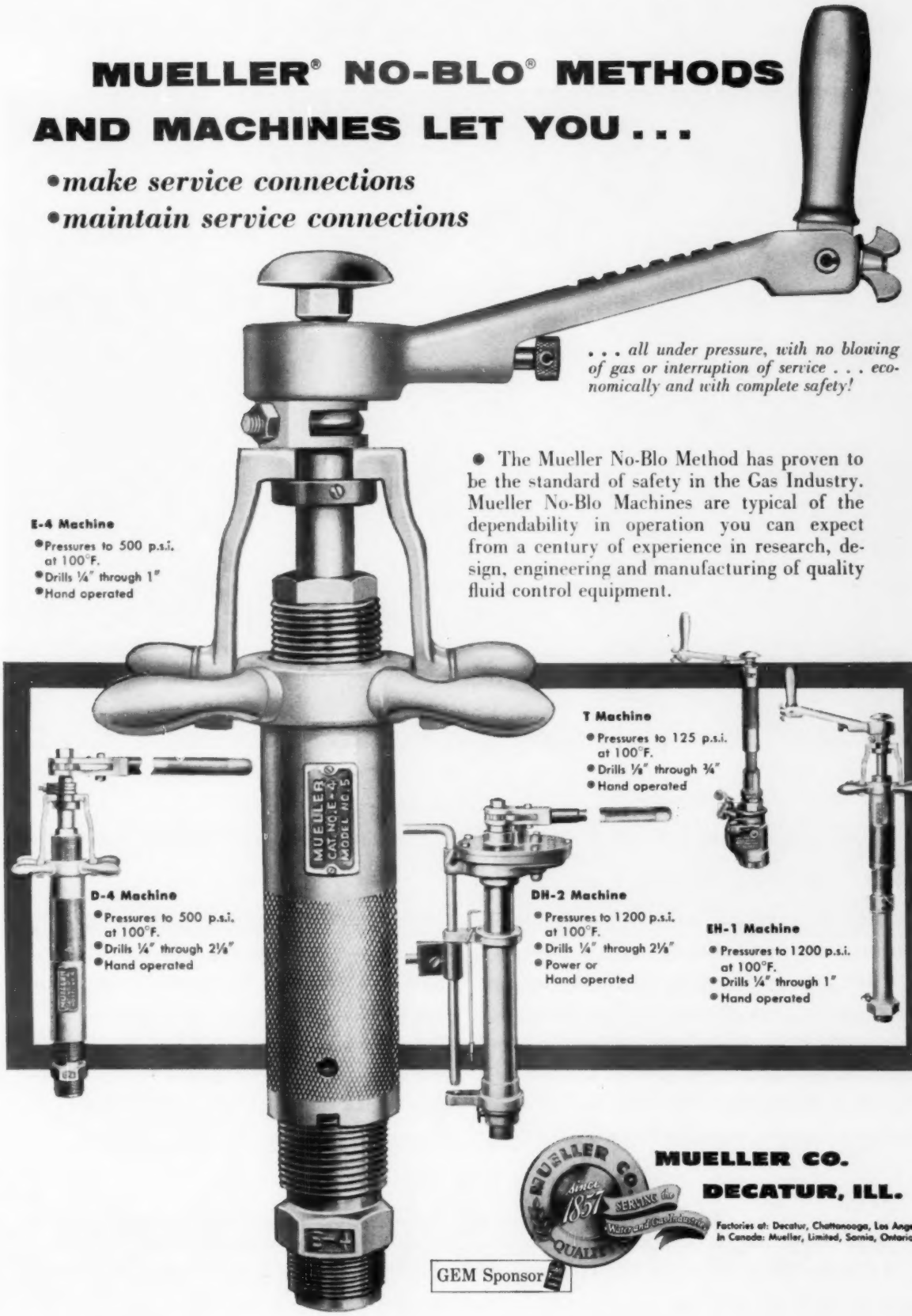

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- Drills ⅛" through ¾"
- Hand operated

D-4 Machine
- Pressures to 500 p.s.i. at 100°F.
- Drills ¼" through 2⅛"
- Hand operated

DH-2 Machine
- Pressures to 1200 p.s.i. at 100°F.
- Drills ¼" through 2⅛"
- Power or Hand operated

EH-1 Machine
- Pressures to 1200 p.s.i. at 100°F.
- Drills ¼" through 1"
- Hand operated

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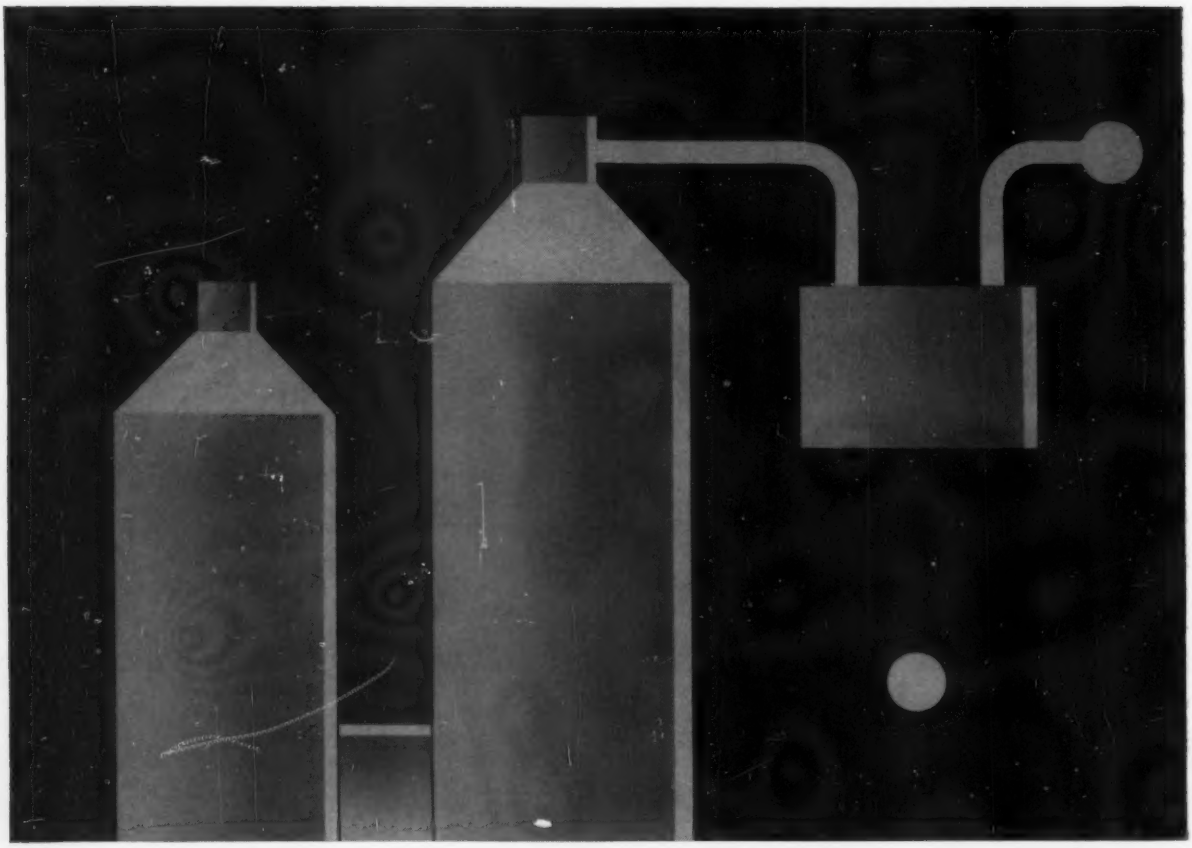
Factories at: Decatur, Chattanooga, Los Angeles; In Canada: Mueller, Limited, Sarnia, Ontario

GEM Sponsor



Get flexibility and economy from peak load facilities

Looking for economical ways and means to supplement your gas production for peak load demands?

United Engineers has developed a thermal oil-gas set of unusually high efficiency. The unit has an exceptionally high capacity and delivers a very acceptable gas, together with good tar. It can utilize feed stocks ranging from diesel oil to gasoline. And the product permits a high degree of interchangeability.

United Engineers is uniquely qualified to help you select the stand-by equipment suited to your anticipated needs. You may need a reliable LP gas plant, a high Btu oil gas apparatus—or a high-capacity UGI Cyclic Catalytic Reforming (CCR) Unit. Whatever your requirements, our background of 75 years' experience, plus our services and facilities, assures you of maximum return for every dollar expended.

UNITED ENGINEERS

& Constructors Inc • U.E.&C. (Canada) Ltd. • New York • PHILADELPHIA • Chicago

New Peerless Gas Cleaner development provides cleaner gas at less cost

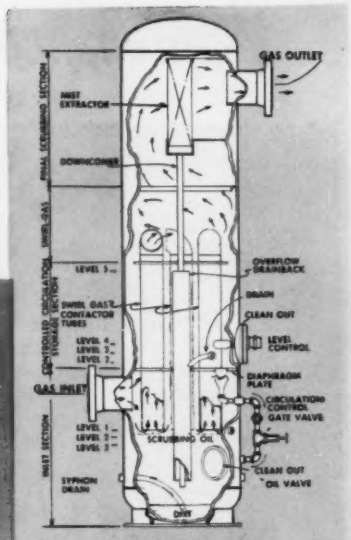
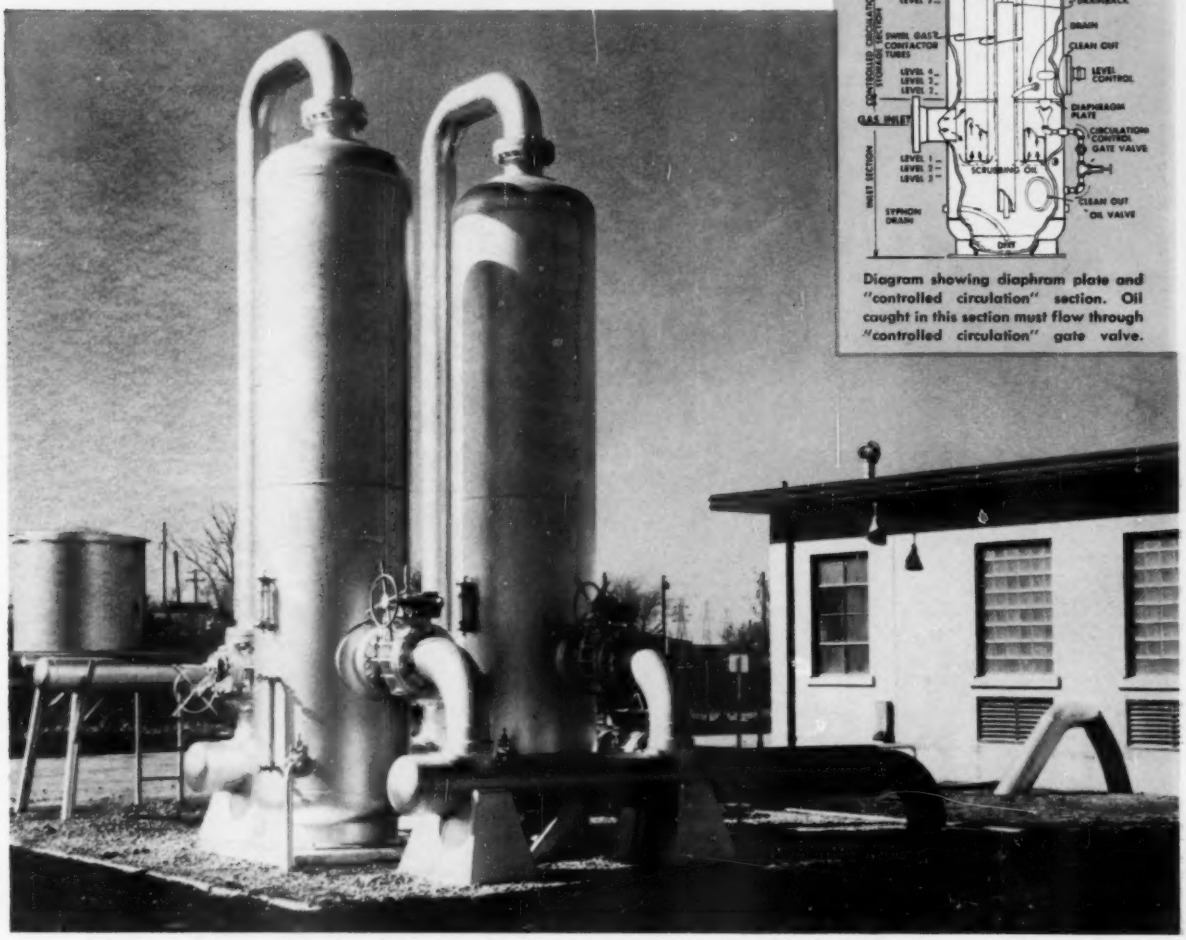


Diagram showing diaphram plate and "controlled circulation" section. Oil caught in this section must flow through "controlled circulation" gate valve.



More efficient liquid and dust removal is provided with Peerless "Controlled Circulation" Vertical Swirl-Gas Cleaner

With given gate valve setting, circulation of scrubbing liquid varies within narrow range even with widely varying gas flows . . . thus greatly reducing scrubbing oil loss. Scrubber will remove small quantities of dry solids or separate large quantities of liquid equally well with no adjustments required. In addition there are higher gas capacities because of limited mist extractor loading, less entrainment at gas exit end of contractor tubes, and use of larger mist extractor.

For details, Write for Peerless Bulletin 6-193.

SEPARATORS:
Liquid Vapor
DUST SCRUBBERS:
Wet and Dry Types
GAS FILTERS
GAS ODORIZERS
SILLERS CLOSURES
OTHER PRODUCTS:
Engine Timers, Scraper Traps, Manways

PEERLESS MFG. CO. DALLAS, TEXAS

PEERLESS MFG. CO.

Representatives in All Principal Cities

P. O. Box 13165 • Dallas 20, Texas

Maintenance Cost Too High?

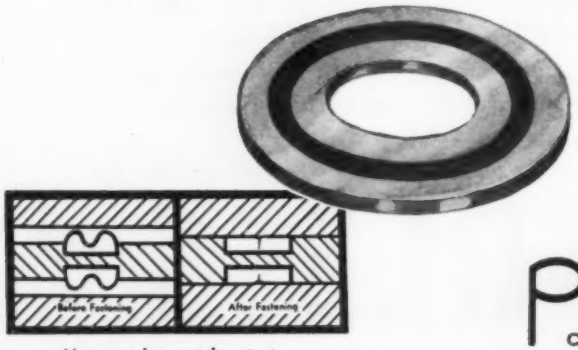
How much time, effort, and money is spent cleaning, resurfacing and/or replacing flanges to replace the seal!

Expensive? Yes!

Why not find out about Gask-O-Seals and save! Here are the facts: With Gask-O-Seal, flange faces require little or no cleaning or resurfacing of flanges when replacing the seal — *and Gask-O-Seals are re-usable.*

Gask-O-Seals save money and effort in many other ways, too. They are visually inspectable, do not need to be re-torqued, there is no material creep and they are non-directional, non-flexible, easy to install. They provide no-leakage sealing, *can not blow out,* and there is no wear due to pulse.

Now available to fit ASA standard flanges. Write for free catalog.

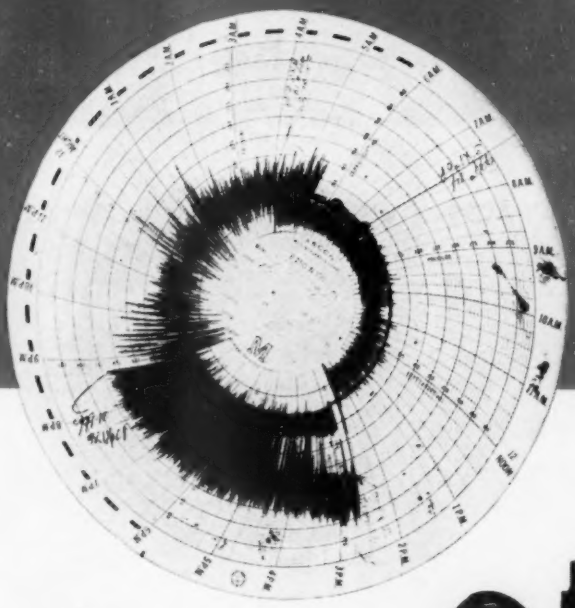


Note metal to metal contact.

Parker SEAL COMPANY

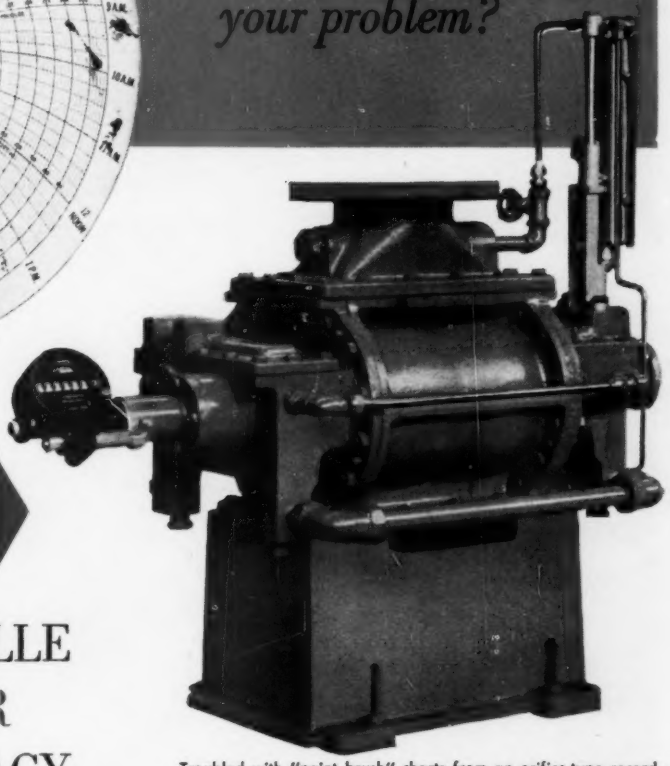
CULVER CITY, CALIFORNIA and CLEVELAND, OHIO

A DIVISION OF PARKER-HANNIFIN CORPORATION



Are "paint brush" charts like this your problem?

Here is your easy-to-read solution.



Troubled with "paint brush" charts from an orifice-type recording meter used for testing wells, Shell installed the R-C Rotary Meter and now obtains clear and accurate data recorded on a punched tape along with other well test information.

ROOTS-CONNERSVILLE ROTARY GAS METER MAINTAINS ACCURACY AND READABILITY, EVEN WHEN FLOW RATES FLUCTUATE RAPIDLY

At Shell Oil offshore installations in the Gulf of Mexico, the oil and gas output of 16 or more wells passes through a single gathering platform before being piped to gas transmission lines, storage tanks and refineries. The gas flow from each well must be measured at intervals so that oil-gas ratios can be determined. Pressure in the well to be measured is reduced to 40 psig for metering, the oil separated, and the gas piped into a 4 x 8 high-pressure R-C rotary positive displacement meter. After a selected period of testing, this well is returned to normal operation and the next well switched in to test. The operation is continuous and automatic on whatever time cycle is chosen. The orifice meters previously used for measuring gas flow recorded the fluctuation in flow in such a way that instrument charts were difficult to integrate. Maintenance requirements were high and frequent chart readings necessary.

The R-C rotary meter accurately measures the fluctuating flows from each well and this accuracy is unaffected by continuous fluctuation. Well pressures range from 50 to 2000 psig. Direct readings, corrected to standard conditions can be taken from the meter or transmitted remotely. No stand-by personnel is needed to service the meter or read charts. Repetitive flow readings can be obtained to determine accurate oil-gas ratios.

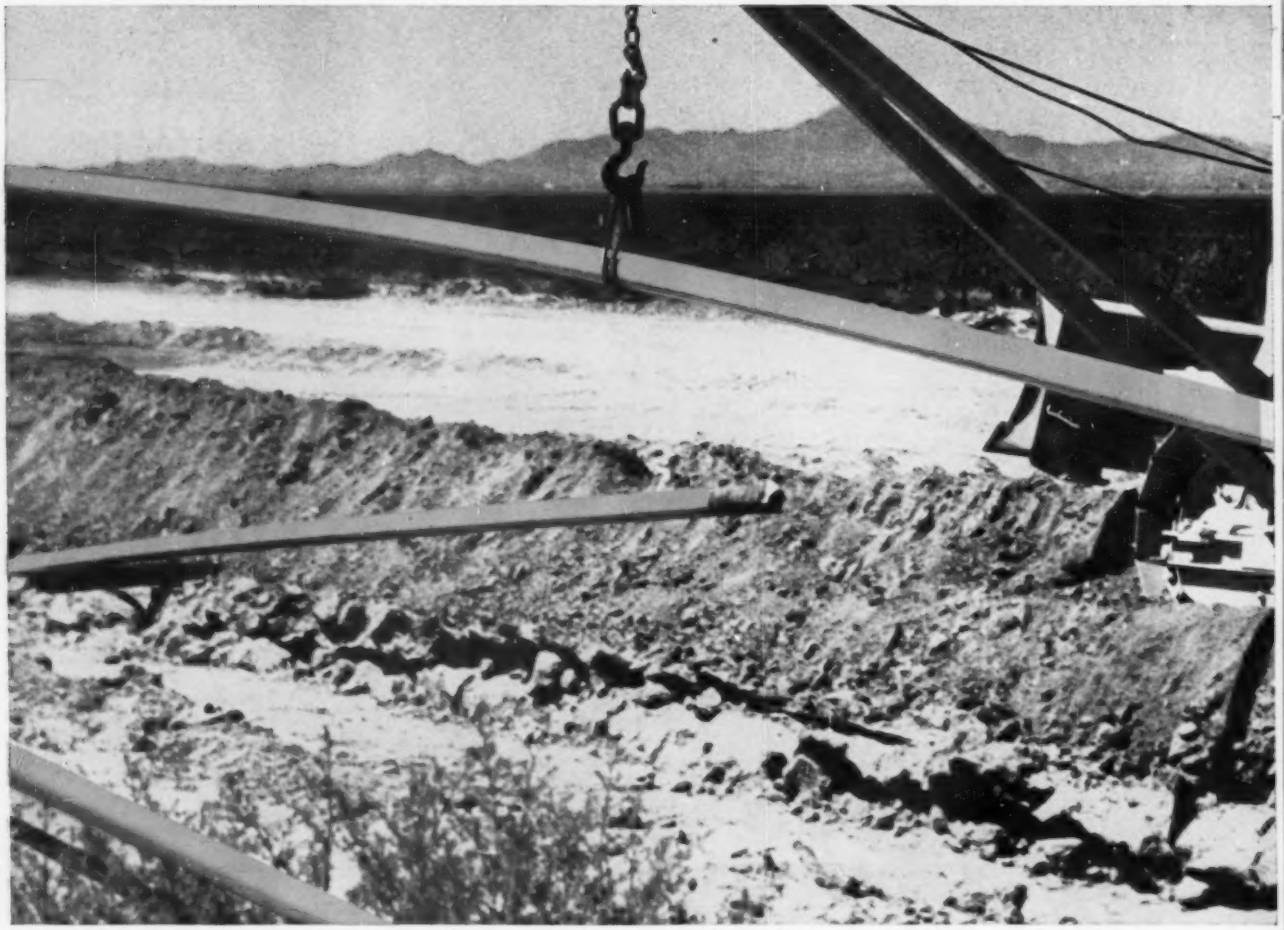
R-C rotary positive displacement meters were selected as a result of field tests, which proved them most accurate in measuring the wide range and rapid fluctuations in flow rates.

ROOTS-CONNERSVILLE BLOWER
DIVISION OF DRESSER INDUSTRIES, INC.
160 Oregon Avenue, Connersville, Indiana. In Canada—629 Adelaide St., W., Toronto

ONE OF THE DRESSER INDUSTRIES

For additional data, please refer to pages 565—568 in Chemical Engineering Catalog or write for Bulletin M—258.

DECISION:



NO DANGER OF BURN-THROUGH when the line pipe is Republic Electric Resistance Weld. Made from prime, flat-rolled steel. Checked for quality and uniformity as only flat-rolled steel can be checked. You get easier bending in field or shop . . . faster line-up of joints . . . better field welds. Mail coupon for details.

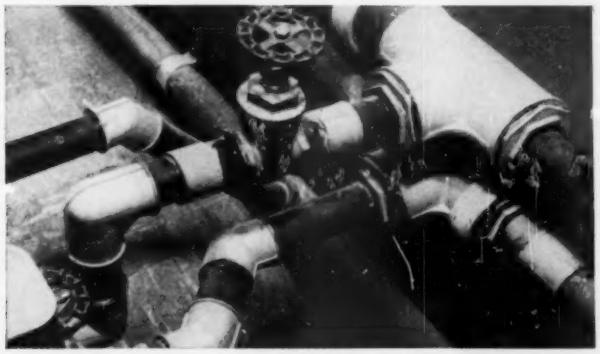
EASY WORKABILITY is a characteristic of Republic Continuous Butt Weld Pipe. Uniform strength and ductility assure fast, trouble-free threading . . . excellent, in-service dependability. Tight galvanized coating resists corrosion. Sizes range from ⅛" through 4" nominal. Available in double random lengths. Send for information.

X-TRU-COAT

ARIZONA PUBLIC SERVICE COMPANY IS USING 110 MILES OF THIS PLASTIC-COATED, CORROSION-PROOF PIPE!

With X-TRU-COAT, corrosion will be sealed out *permanently, before* delivery, at *lowest* overall cost. That was the decision of the Arizona Public Service Company, Phoenix, Arizona. They are using *110.7 miles* of this polyethylene-coated pipe in a project designed around company-owned and -serviced irrigation pumps. The project will save farmers as much as 11% yearly on power costs. They will be relieved of excessive investment... pay only for horsepower delivered to the pump shaft.

Anything *but* an ordinary product, Republic X-TRU-COAT merits your investigation. Learn how its tough yet flexible coating wards off electrolytic action... is immune to the most severe acid or alkaline soil... stands up under the abuse of shipping, loading, trucking, and handling. Your Republic distributor has complete information. Call him today or mail the coupon.



INSTALL WITH CONFIDENCE! The product of a corporation with more than 50 years of pipe-making experience, Republic SRK Plastic Pipe has the high degree of quality essential in severe corrosion applications. Republic has the know-how and facilities — works full-time — to bring you plastic pipe that performs better, longer, at lowest possible cost.

REPUBLIC STEEL

WORLD'S WIDEST RANGE
OF STANDARD STEELS AND STEEL PRODUCTS

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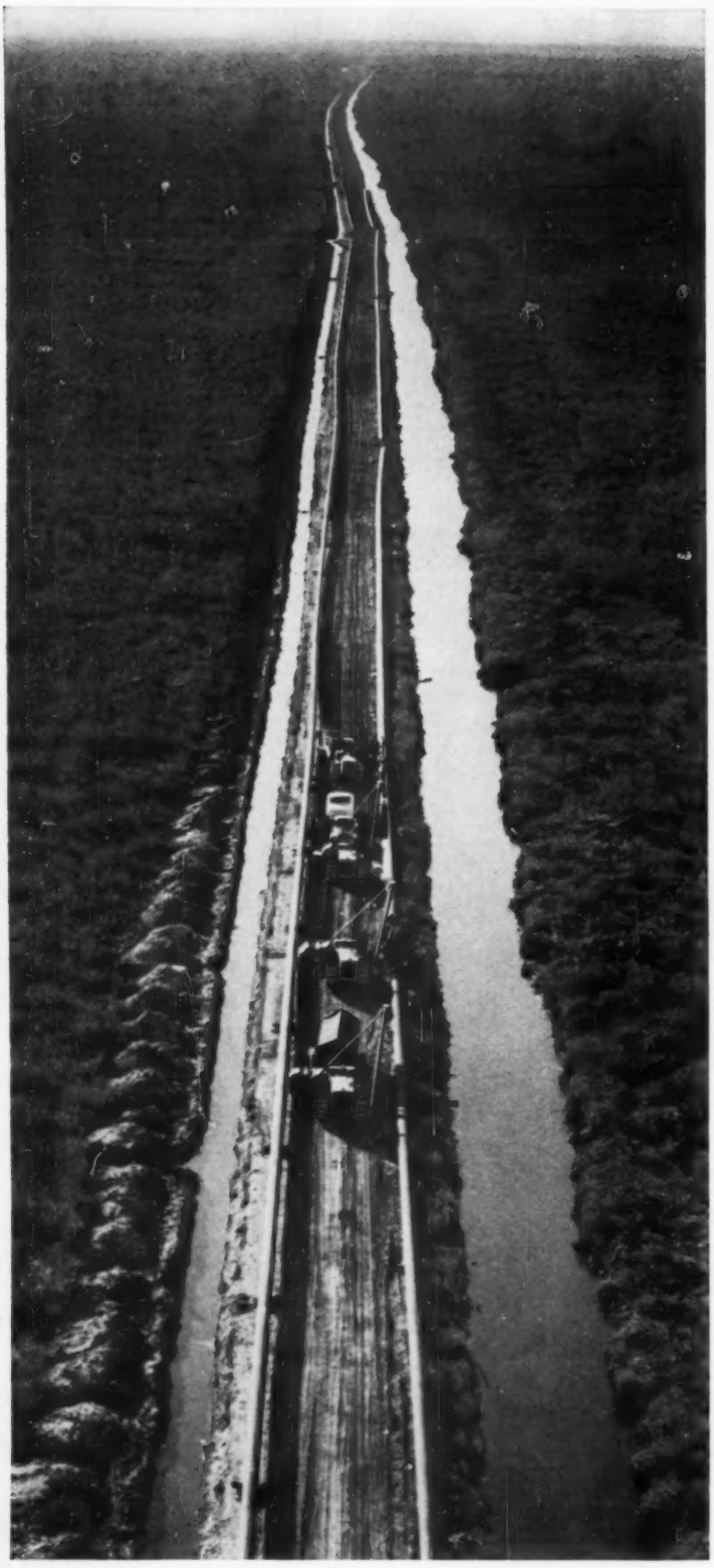
Please send more information:

- ☐ X-TRU-COAT Plastic-Coated Steel Pipe
- ☐ Electric Resistance Weld Line Pipe
- ☐ Semi-Rigid (SRK) Plastic Pipe
- ☐ Continuous Butt Weld Pipe

Name _____ Title _____
Firm _____
Address _____
City _____ Zone ____ State _____



HOW TO CHECK OUT THE TOUGHEST TAPE EVER WRAPPED AROUND PIPELINE

Give it the works . . . that's what Polyken did to its latest development—Extra Strength No. 960

. . . Run it through every tape durability test a laboratory can apply.

. . . Wrap this rugged tape around 30 miles of 24-inch gas line in the swamp water and coral rock of southern Florida. Let an Iranian oil company use it on 200 miles of desert oil line. Put it to work for the Phillips Petroleum Co. in Texas and Canada.

If a tape coating can stand all this and still do the whole job cheaper than hot dope, you've got something special. Something permanent in pipeline protection—Polyken Extra Strength No. 960 Pipeline Roll.

Available at no extra cost.

Applying Polyken protection, as seen above, the Houston Texas Gas and Oil Corporation laid a 1600-mile gas line from Louisiana to Florida. Polyken saved them $500 per mile by way of less men per job and more miles per day. Tape's ready. No primer, no drying or cooling, no fumes or fire hazard. And *low* equipment cost.

Get the full particulars on Polyken performance and economy from your Polyken representative or write Polyken Sales Division, 309 W. Jackson Blvd., Chicago 6, Ill.

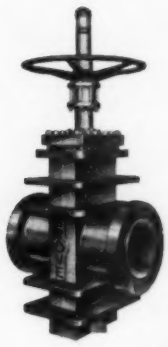
Polyken®

Experienced in modern PROTECTIVE COATINGS

THE KENDALL COMPANY
Polyken Sales Division

IN CASE OF ANY EMERGENCY

HERE'S THE VALVE YOU KNOW WILL WORK



This is a rugged, dependable valve you can forget until you really need it. When you do—it'll work. There's no wedging to cause wear and jamming. The polished gate slides easily and quickly between smooth metal seats and rugged "O" rings. Exclusive Grove design lets gate and seats float free—eliminates distorting effects of pipe-line strain, internal pressure and temperature. Requires as many as 250 less turns to close than some competitive valves, too.

And, there's no lubricant to forget or to be washed away. Tough, flexible "O" rings are always there when you need them to give a bubble tight seal every time.

The next time you need valves, call your Grove man. He has the valves you can really depend on.

GROVE VALVE and REGULATOR COMPANY

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Save $26 to '60 FORD

That's your first saving—but not your last! Save again with over twice the front tire life! Again with 25.2% greater gas mileage! And it's all certified in tests by independent experts!

We're talking about big money . . . real money . . . *your* money! And there's no question about saving it! Of all the leading makes, Ford Light- and Medium-Duty Trucks are the lowest priced, straight across the board! But initial price savings are just the start!

TRUE TRUCK-TYPE SUSPENSION CUTS TIRE WEAR

Ford Pickups are mustang-tough—built for the roughest going, with the proven truck-type front suspension. However, some 1960 trucks use a soft-type independent suspension which wears out front tires twice as fast. Certified tests by independent research engineers* have proved this. And the difference in wear, over the life of a pickup truck, can amount to $300 in tire savings; even more on a medium-duty truck!

HIGHEST IN GAS MILEAGE!

1960 Ford Pickups are gluttons for *work*—not for gas! That's proved by certified economy tests of Ford's modern six-cylinder engine! It's the same dependable cost-cutter that scored 25.2% more gas mileage than the average of all competitive makes in Economy Showdown U.S.A.!

SIGNED, SEALED CERTIFIED SAVINGS!

Yes, this year, if you buy a Ford instead of a competitive truck, you can be sure to save—Ford's economy is certified! Check the certified records yourself in your Ford Dealer's "Certified Economy Reports"...see and drive the new Ford Trucks . . . check the price tags . . . *and you'll save for sure!*

**Names on request. See your Ford Dealer.*

FORD TRUCKS

$246 on a Truck!

PRICED BELOW ALL OTHER LEADING TRUCK MAKES**

	FORD SAVES YOU
HALF-TON PICKUPS F-100 CLASS	$33 TO $181
HALF-TON PANEL F-100 CLASS	$40 TO $161
THREE-QUARTER TON PICKUPS F-250 CLASS	$32 TO $185
TON-AND-A-HALF STAKES F-500 CLASS	$26 TO $246
TWO-TON STAKES F-600 CLASS	$33 TO $141

***Based on a comparison of the latest available manufacturers' suggested retail delivered prices, including Federal excise tax, excluding dealer preparation, conditioning and destination charges.*

COST LESS

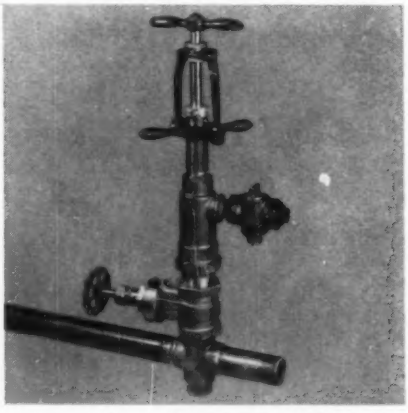
...LESS TO BUY...LESS TO OWN... BUILT TO LAST LONGER, TOO!

INSTALL MUELLER® EXTENSION STOPPER FITTINGS NOW!

...extend lines anytime without shutdown!

Here is a fast, simple method to extend dead ends without interrupting service on the existing line.

1 Uncover Mueller H-17151 Extension Stopper Fitting which was installed as dead end cap when original line was laid.



2 Stop-off line at fitting with Mueller Stopping Machine and cut off capped end of fitting.

3 Weld new line extension to fitting and weld Mueller H-17490 Save-A-Valve Drilling Nipple to new line.

4 Purge air from new line and equalize pressure by running hose from by-pass connection of stopping machine to drilling nipple.

5 Remove stopping machine and other equipment and plug and cap extension stopper fitting and drilling nipple.

Write for complete information and specifications on these exclusive fittings for dead end extensions. Other Mueller Extension Stopper Fittings are available for future stop-offs and for lateral connections.

GEM Sponsor

NO-BLO®

MUELLER CO. Since 1857 Serving the Water and Gas Industries Quality

MUELLER CO.
DECATUR, ILL.

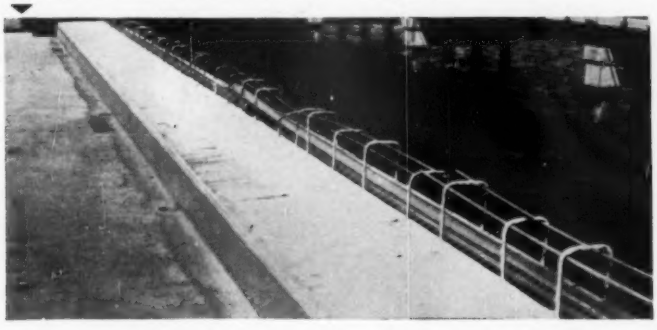
Factories at: Decatur, Chattanooga, Los Angeles;
In Canada: Mueller, Limited, Sarnia, Ontario

Another new development using

B.F.Goodrich Chemical *raw materials*

160-ton concrete roadway sections cast by Prestressed Concrete Products Co., Inc., Mandeville, La., are barged to Pensacola, Florida, and lifted onto piers of this new highway bridge.

2" vinyl conduit for bridge lighting and ¾" for navigation lights encased in concrete parapet, poured after bridge slabs are in place. Conduit is made by Dixie Plastics Mfg. Co., Division Marine Controls Laboratories of New Orleans. B.F.Goodrich Chemical Company supplies Geon vinyls.



40,000 feet of conduit made of Geon vinyl matches permanence of concrete structure

Electrical conduit made of Geon rigid vinyl will be encased in concrete to become a permanent part of this new 3-mile bridge. It's permanent because Geon vinyls resist the moist, salt atmosphere; corrosion won't shorten life or cause clogging of the conduit.

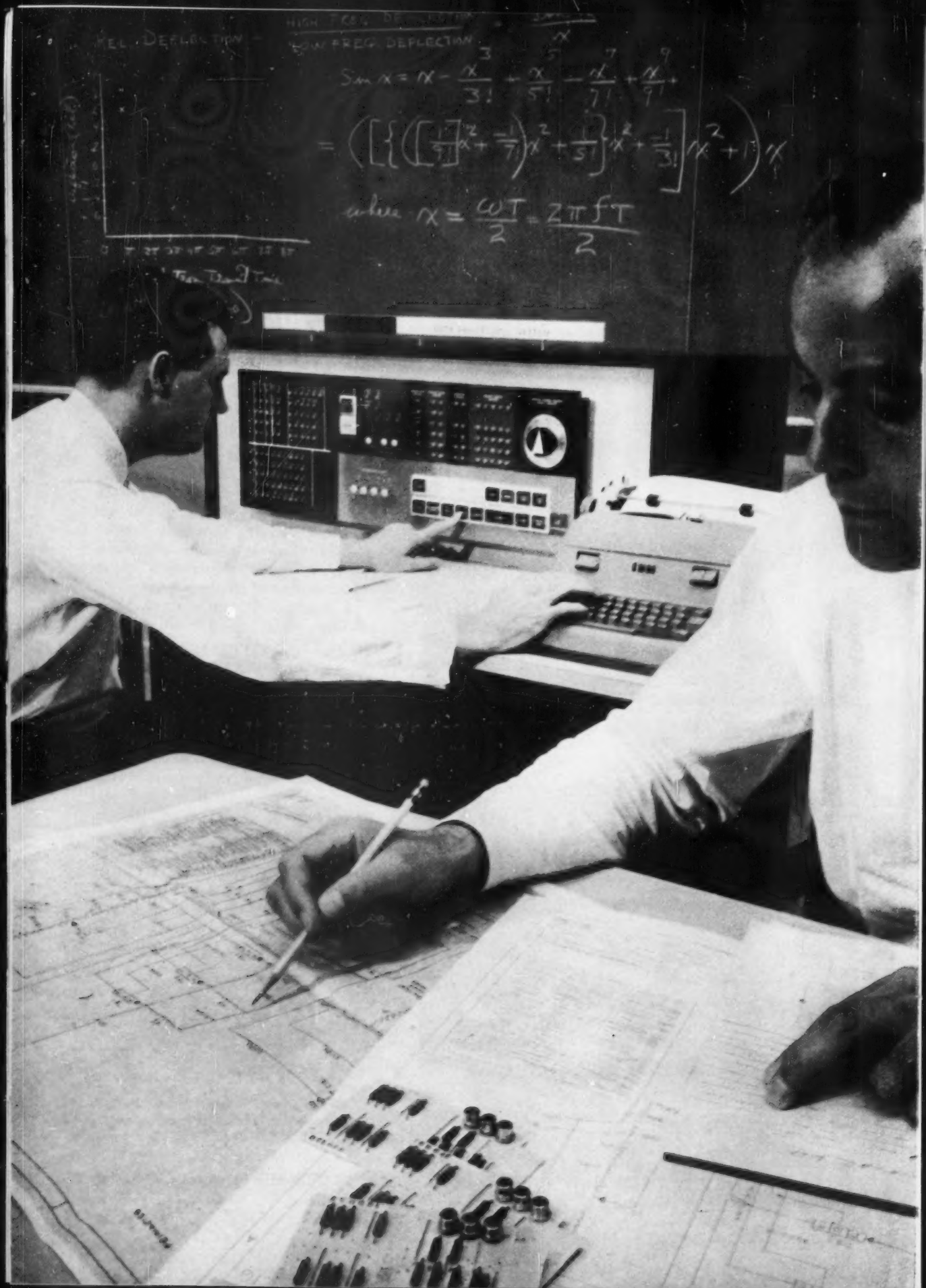
A unique, sealed slip joint, also made of Geon vinyl, in each conduit line is inserted between every concrete section. This allows for expansion and contraction of the bridge, while maintaining a watertight seal in the conduit.

Rigid vinyl conduit and pipe made from Geon is lightweight and easy to install. Being a non-conductor, vinyl is not affected by ground currents. It has high tensile and impact strength, and it resists fungi, bacteria, heat and cold. To learn more about these and other products made from Geon vinyls, write Dept. GS-1, B. F. Goodrich Chemical Company, 3135 Euclid Ave., Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

Geon VINYLS

B.F.Goodrich Chemical Company
a division of The B.F.Goodrich Company

B.F.Goodrich GEON vinyls • HYCAR rubber and latex • GOOD-RITE chemicals and plasticizers


HEL. DEFLECTION
HIGH FREQ. DEFLECTION
LOW FREQ. DEFLECTION
$\sin x = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \frac{x^9}{9!} +$
$= \left(\left[\left\{\left(\left[\frac{1}{9}\right]x^2 + \frac{-1}{7}\right)x^2 + \frac{1}{5!}\right\}x^2 + \frac{-1}{3!}\right]x^2 + 1\right)x$
where $x = \frac{\omega T}{2} = \frac{2\pi f T}{2}$

announcing the new

IBM 1620

first solid state engineering computer in the low-price field

Here is a new and powerful stored program, desk-size computer designed to bring more computing ability to engineering problems at low cost.

Transistorized throughout, the IBM 1620 is the only solid state, core-storage computer in its price class.

Easy to learn—easy to operate—easy to communicate with—this powerful computer relieves engineers from routine calculations—frees them for creative tasks.

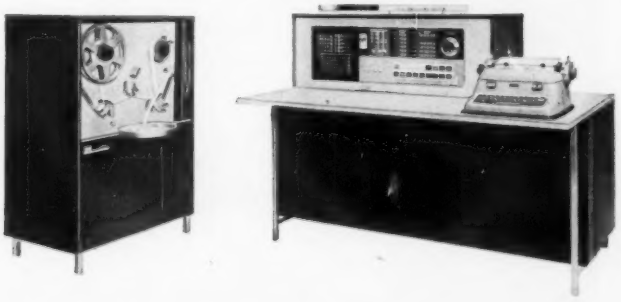
Data is fed into the 20,000-digit magnetic core memory of the 1620 via punched paper tape. Alpha-numeric output is printed at the console typewriter in desired format, under stored program control.

This new computer with its two-address instruction format and variable field length, gives you up to 50% more storage capacity than a fixed word-length system.

All notations of input and output are in the decimal system. An unlimited decimal field and internal self-checking assure accuracy. A powerful two-address instruction format adds to the 1620's timesaving capabilities.

Programming is simplified through the use of IBM Fortran—a mathematical programming system which compiles machine instructions from algebraic and English language notation. A library of programs for standard engineering computations will also be part of the 1620 package.

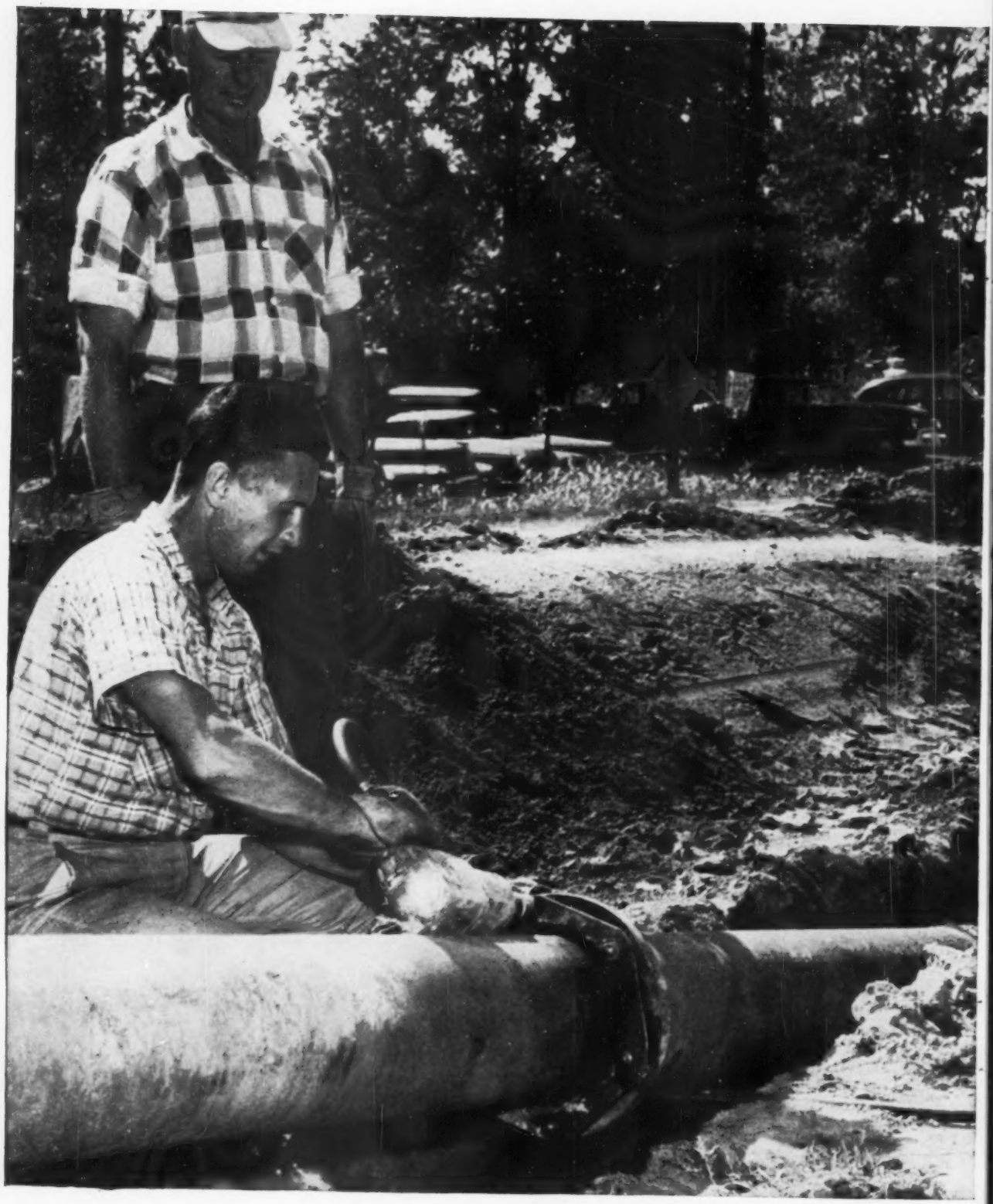
Call your IBM representative—ask him to show you all the unique features of the IBM 1620. Like all IBM data processing equipment, this system may be purchased or leased.



BALANCED DATA PROCESSING

IBM®

Balanced Data Processing combines systems and services inseparably to produce performance in the best tradition of more than 45 years of IBM experience. It means more production per data processing dollar for you.



THE MARK OF THE 100-YEAR PIPE

For ruggedness where you need it the most...

CAST IRON PIPE MECHANICAL JOINTS

Cast iron pipe manufacturers insure extra flexibility by the use of a mechanical joint that will withstand normal distribution pressures. Vibrations, washouts, heavy surface loads—mechanical joints resist them all, and the design of the joint permits deflection of the pipe during and after installation.

Ruggedness inherent throughout cast iron pipe

The joint is merely an example of cast iron pipe's toughness. Modern cast iron pipe also offers *great beam strength*—to resist heavy traffic above, and shifting soils below; *tremendous load resistance*—6" cast iron pipe withstands a load of nearly 9 tons per foot; *corrosion resistance*—to withstand most adverse conditions.

Most important of all is the fact that once you have laid cast iron pipe, you can generally anticipate *no major repairs for at least a century!*

Write for complete information to Cast Iron Pipe Research Association, Thos. F. Wolfe, Managing Director, 3440 Prudential Plaza, Chicago 1, Ill.

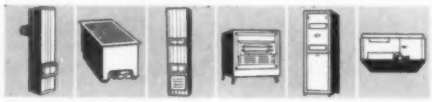
...all good reasons for you to choose

CAST IRON PIPE

EMPIRE

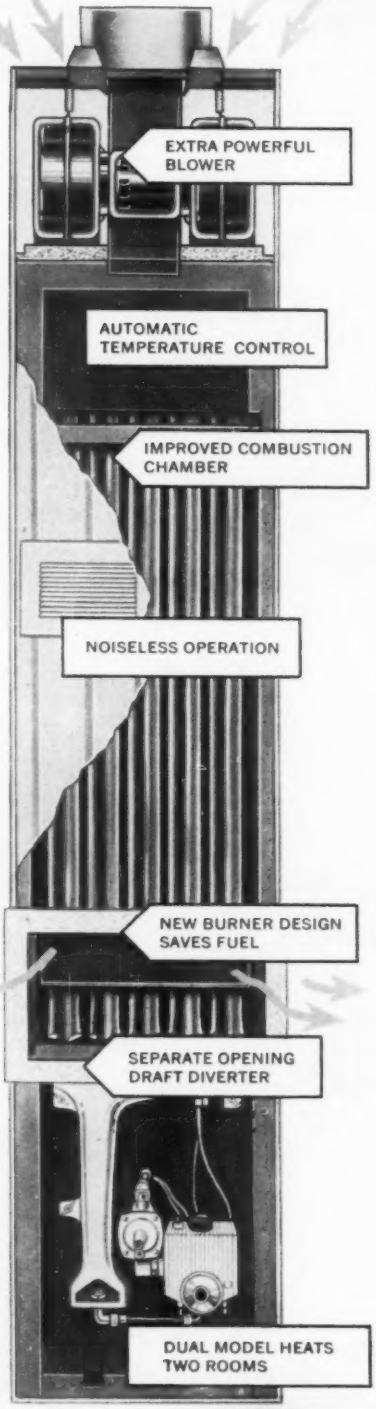
GAS WALL FURNACE NOW PROVEN BETTER!

Gives amazing heating efficiency with exclusive COUNTER-FLOW ACTION . . . delivering heat near floor level with cool air return at ceiling, blanketing the entire area, from floor to ceiling, with an even comfortable heat. Check all Empire's exclusive features NOW!



Empire

Manufacturers of the finest complete line of Certified Gas heating appliances



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EMPIRE STOVE COMPANY • BELLEVILLE, ILLINOIS

Quick! Send more details on the Wall Furnace.

NAME _____

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ADDRESS _____ CITY _____

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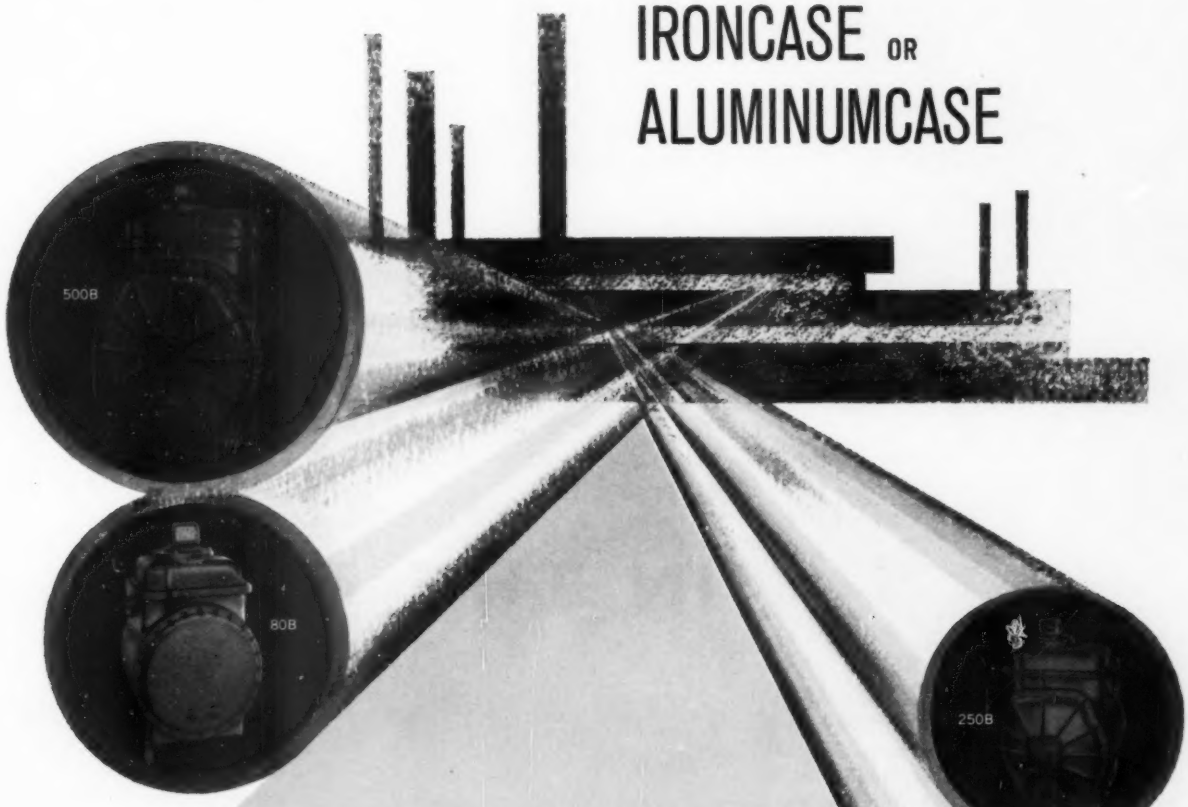
advance the gas flame everywhere

POSITIVE METER ACCURACY FOR THE BIG LOADS

IRONCASE OR ALUMINUMCASE



Precise measurement accuracy under all conditions year-in and year out.

Rated capacities to 10,000 cfh — 0.60 sp. gr. gas.

Working pressures to 250 psi in rugged Ironcase meters . . . to 100 psi in light weight Aluminumcase meters.

All 250 psi working pressure Ironcase meters now made from ductile iron and hydrostatically tested at 1000 psi to provide an increased factor of safety.

Molded 3-convolution Duramic diaphragms for all fuel gas services.

Permanent steel inserts in connections of Aluminumcase models eliminating thread galling.

Longest service life with lowest maintenance cost.

GEM — GAS EQUIPMENT MANUFACTURERS' GROUP — MEMBER

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INCORPORATED (ESTABLISHED 1836)

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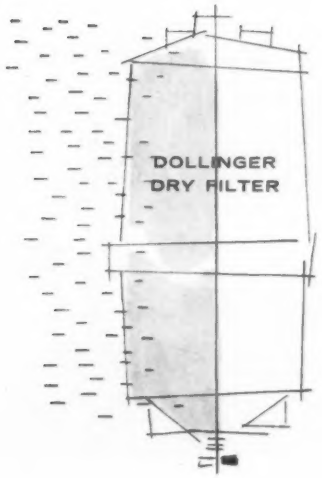
IN CANADA: Canadian Meter Company, Ltd., Milton, Ontario • Calgary Edmonton • Montreal • Regina • Vancouver

SUPPLIERS TO THE GAS INDUSTRY for Ironcase, Tinned Steelcase, Aluminumcase and Welded Steelcase Meters • American-Westcott Orifice Meters Instruments • Reliance Regulators • Apparatus • Valves



SPECIALISTS
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PREVENT CLOGGED GAS LINES IN THE FIELD...

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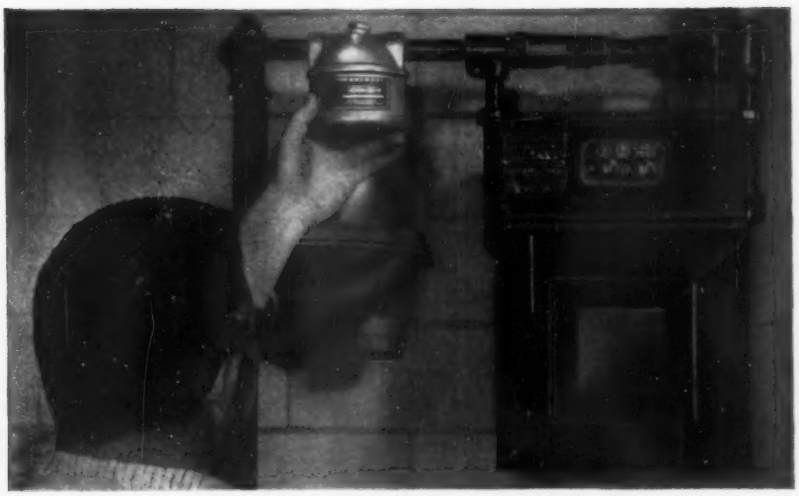
IN THE HOME



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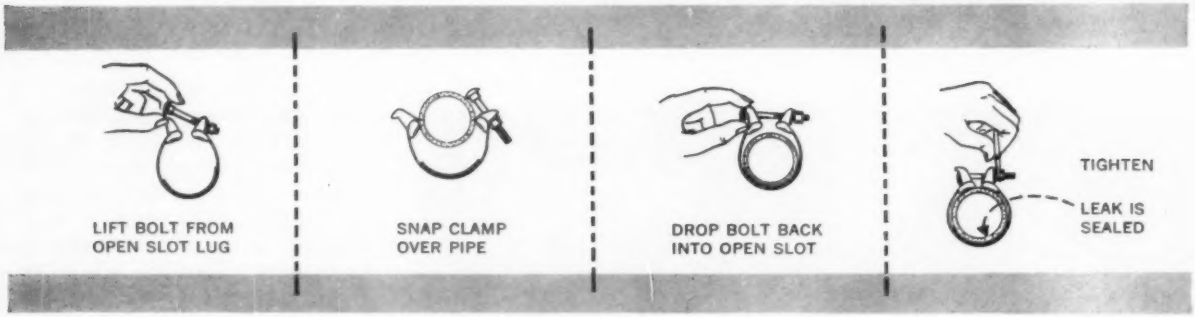

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NEWS
FOR GAS UTILITIES

A message to our friends in the Gas Industry

from William H. Cochrane, President, Neptune Meter Company

I'm happy to announce that Superior Meter Company has been merged into Neptune Meter Company's corporate structure. Our former subsidiary will now be known as the Superior Meter Division of Neptune, and will have Walter H. Sieger, Vice President of Neptune and for 26 years a Neptune executive, as General Manager.

Neptune operates in many measurement fields. We have a wealth of experience in accurately measuring and controlling the volume, weight and temperature of gases, liquids and solids. We produce measurement instruments and systems for utilities, municipalities, agriculture; for industry and for defense.

Superior Meter Division operates with its own sales organization as a self-contained unit within our team. It will benefit in many ways by being a member of the team . . . through the use of our warehousing facilities and through the interchange of experience and knowledge gained from our research and development programs. Like the other divisions of Neptune, Superior will now have the technical and financial resources to exploit major advances in measurement. As a result, we are sure that you in the gas industry business will also benefit.

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GAS

JANUARY 1960

...management development

Appraising and developing managerial personnel

By HUGH C. WYLAND, Director
Industrial Relations Department
Commonwealth Services Inc., New York

THE greatest asset of any company is its people. The physical plant and facilities serve little purpose without trained managers and employees to put them to effective use.

It is a matter of primary importance that every constructive effort be made to train, develop, and conserve this most valuable resource. To do so requires the same type of sound management planning as would be applied in financing and construction of new physical facilities, or in the budgeting of next year's income and outgo. The problem must be identified, analyzed, and evaluated; and plans must be made and carried out in such a manner as will best meet the indicated needs and objectives. As far as personnel are concerned, the basis for all development activities is a complete inventory and appraisal of present managerial personnel.

The purpose of this guide is to provide a common basis for "taking stock" of present personnel resources, and for development of talents and capacities to assure that both the present and future manpower needs of the company are met.

• Basic purposes

The basic purposes of the Management Development Program are:

1. To make all employees aware of the opportunity for personal growth and development in order to assure adequate replacements for those who retire and those who are lost because of disability or for other reasons, and to assure that trained individuals are available to fill supervisory and managerial positions which will be created because of growth and expansion of the company.

2. To make the most effective use of the talents and potentialities of the present group of employees—that is, to improve present performance on the job.

3. To provide a sound basis for meeting future development needs of the company.

• Immediate objectives

1. To prepare organization development charts covering all departments, divisions and sections or districts of the company as a basis for clarification of organization structure and sound organization planning.

2. To prepare complete descriptions of the duties and responsibilities of all executive, managerial and supervisory positions. These position descriptions provide a set of agreed-on duties and responsibilities against which individual performance may be appraised.

3. To determine how well the individual is performing in his present position on the basis of examining the job itself, or what is expected of the individual; the quantity and quality of the work performed; and the methods used in performing the job.

4. To discover individual talents and strengths so that they can be maximized, and to point out weaknesses so that they can be corrected and minimized in the performance of the job.

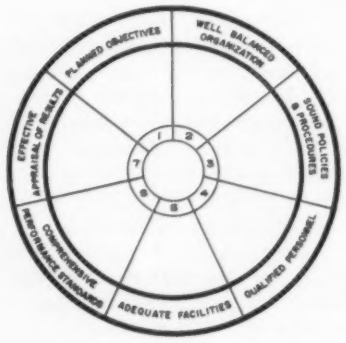
5. To develop, for each individual appraised, a program for personal development which will meet his needs and provide the most effective utilization of his talents and potentialities.

• Basic development principles

In planning the Management Development Program, the company has been aware of and guided by certain basic principles which may be summarized as follows:

1. Managing is a distinct and professional kind of work which is basically the direction of people—not things.
2. The manager cannot delegate his own responsibility to train and develop his people. He may delegate other responsibilities but he cannot delegate his responsibility to the people reporting to him.
3. The skills and tools of effective management can be learned.
4. Every manager can make improvements in his present performance. Most managers do not come near to realizing their full ability and potential as managers. Road blocks are put in their way by their own attitudes or habits, by their superiors, or by company organization and practices. These road blocks can be identified and minimized as a result of management development action.
5. Every individual wants to know, and should be informed about "how he is doing." Most individuals sincerely want to do the best job they are capable of doing, and want to know how their superiors view their performance and what can be done to improve it.
6. All improvement is, in the final analysis, self-improvement. The primary role of the company is to help the individual identify and eliminate obstacles to his development, and provide the proper climate, challenge, and opportunity for self-development.
7. All development action should be tailored to the particular needs of the individual. One man's strength may be another man's weaknesses. It is most important, therefore, that development efforts be individualized.
8. The place to begin development action is the *present* job. Preparation for assuming greater responsibility begins with maximum performance of the present job.

The material which follows is intended to provide a guide for carrying out these basic principles and purposes.



Seven elements of management

POLICIES AND PROCEDURES

• The group to be appraised

ALL employees who are at or above the first level of supervision shall be included in the Management Development Program and appraised in accordance with the policies and procedures set forth here. It is this group which is defined as the "management group" for purposes of the development program.

It is not intended to eliminate other employees from participation in the Management Development Program. Rather, it is intended only to define the group to be appraised first, and then give consideration to other employees who may be ready for advancement to the management group. Accordingly, certain employees who are not now at or above the first level of supervision will be included in the program as considered desirable. In addition, certain professional, technical or administrative personnel may be included as considered appropriate.

• Scheduling of appraisals

A detailed schedule for the actual conduct of the appraisals will be set up for each department, division, or other organization unit of the company. It is intended that all individuals included in the development program shall be evaluated within 12 months after the start of scheduled appraisals. Following this, annual appraisals will be made to coincide with the individual's anniversary date of employment if possible.

• Method of appraisal

Appraisals of personnel will be made by specially selected groups of three to five individuals to be known as appraisal committees. In no case will an appraisal committee exceed five individuals, although others may be called in to participate unofficially on a particular matter under discussion. A particular appraisal committee shall be made up as follows:

1. The immediate superior of the individual being appraised shall be chairman of the committee.
2. At least two other individuals who are generally familiar with the person being appraised and at or above the organization level of the committee chairman shall be included on the appraisal committee. In no case will an individual be appraised by persons who are his subordinates, or who are at his same organization level. The individuals selected to participate in the appraisal may be in the same department or division as the individual who is being appraised, or they may be from other departments or divisions if circumstances warrant. The personnel department shall assist in the appointment of committees and shall coordinate the scheduling of meetings.
3. A representative of the personnel department shall serve in a staff capacity on all appraisal committees in order to provide necessary records and reports, assure consistency of appraisal policies and procedures, and prepare

EMPLOYEE APPRAISAL REPORT

Date of Appraisal_____

PERSONAL DATA

NAME_____ TITLE_____
DEPARTMENT_____ DIVISION_____
SECTION OR DISTRICT_____ LOCATION_____
EDUCATION:

SUMMARY OF WORK HISTORY WITH COMPANY:

WORK HISTORY OUTSIDE COMPANY:

OTHER SIGNIFICANT FACTORS: (Awards, letters of commendation, civic participation, lost-time occupational accidents, general health, conduct record, etc.)

PERFORMANCE

RESULTS: (What has this individual accomplished in measurable results recently or since his last appraisal? Consider quantity, quality, cost and time element of work. Give facts and figures wherever possible. Consider human relations. Be specific.)

METHODS: (How does this person go about getting his job done? How does he work with and through people? Be specific.)

PERSONAL QUALIFICATIONS

(List only outstanding qualifications either above or below average)

GENERAL:

STRONGEST SINGLE QUALIFICATION:

POTENTIAL

(Does this individual have potential beyond his present job? If so, outline.)

CURRENT STATUS

1. Immediately promotable
2. Promotable with further training
3. Satisfactory plus
4. Satisfactory
5. Satisfactory minus
6. Inadequate
7. Decision deferred because new

ACTION

(What is specifically recommended for improved performance on present job? What other action is recommended?)

APPRAISAL MADE BY

NAME_____ TITLE_____ NAME_____ TITLE_____
NAME_____ TITLE_____ NAME_____ TITLE_____

APPRAISAL REVIEWED BY

NAME_____ TITLE_____ DATE_____
(Signature)

POST-APPRAISAL INTERVIEW

The Performance and Personal Qualifications section of this report have been discussed with employee By: NAME_____ TITLE_____ DATE_____
(Signature)

Comments on Post-Appraisal Interview:

FIGURE 1

summaries of committee discussions as necessary.

• Post-appraisal interviews

In all cases the results of the appraisal shall be discussed with the individual concerned in a post-appraisal interview. This interview shall be the responsibility of the immediate superior of the person appraised.

• Briefing before appraisals

In order to insure common understanding of objectives, methods, and procedures, it is a matter of policy that all management personnel will be given briefing sessions. These sessions will be conducted prior to the appraisals. The material contained in this guide will constitute the outline for the briefing session.

• Administration of the program

The basic responsibility for making the Management Development Program effective and meaningful is in the hands of every line executive, manager or supervisor. The responsibility for coordinating the administrative details of the program is assigned to the personnel department.

THE APPRAISAL SESSION

FOLLOWING selection of the appraisal committee and a briefing of the committee members on the nature and scope of their duties, it is possible to proceed with the actual appraisal of particular individuals. The original appraisals will begin with individuals at the top of the department or division and move downward to first-level supervision.

The scheduling of the appraisal session should be such as to emphasize its importance. The session should not be regarded as a "routine" affair; rather, it should be scheduled to provide unhurried and uninterrupted opportunity for full, frank and objective discussion of each individual under consideration. The session itself should be looked upon as a reasonable, natural, and uncomplicated means of appraising and developing management personnel. It is highly important that each member of the appraisal committee enter into the spirit of the appraisal process and give his best effort to the scheduled session. Only in this manner can the results be objective and meaningful.

• Getting the session started

The chairman of the appraisal committee is responsible for seeing that the meeting is conducted in an orderly and objective manner. He sets the "climate" for the discussions by stimulating and guiding the members of the committee to give full, frank and objective expression of their views. Some pointers to be noted:

1. Schedule the meeting so that it can be completed in a single *uninterrupted* session, normally not exceeding three hours.
2. Note and stress the completely constructive and confidential nature of the discussions.
3. The chairman should not dominate the committee by his own preconceived views of the subordinate. In general, he should make his views known after others have had opportunity to express themselves.
4. Do not follow a rigid or formal pattern. Make use of the outline contained in the guide, but conduct the meeting in an informal manner.
5. Avoid generalized statements. The chairman should require specific support for any generalized statements—a "how" or "why" or "give a specific example" type of statement.
6. Avoid man-to-man comparisons. The purpose of the session is not to compare subordinate A with subordinate B, but to think in terms of a specific subordinate—the job he personally is expected to do and the standards which constitute good performance in his own job.
7. Make certain that the discussion is balanced. Point up both the strengths and weaknesses of the individual's performance. Keep the "tone" of the discussion objective and constructive, in line with the primary goal of helping an individual to improve his performance and accept larger areas of responsibility.
8. In getting the meeting started, the chairman should mention that the appraisal procedure involves the following steps:
   (a) A brief statement of the personal history of the individual. This will be supplied by the personnel department.
   (b) A discussion of the individual's job—or

what he is expected to perform. The position description covering the individual's duties and responsibilities will be the starting point of this discussion.

(c) A discussion of how well the individual has performed the duties and responsibilities of his job, including results obtained, methods used, and personal qualities related to the performance.

(d) A discussion of the current status of the individual, his potential for advancement, and specific recommendations for his development.

• Statement of personal history

The appraisal session will normally begin by making reference to the organization chart on which the individual is carried. In this way, the committee will start with a common knowledge of the organizational status of the individual. The committee will also have information on the year of birth, year of first employment with the company, and year of normal retirement.

In addition, the personnel department will furnish the committee with the following factual information:

1. Educational background
2. Summary of work history with company
3. Summary of work history outside company
4. Other significant information such as awards, letters of commendation, civic participation, lost-time occupational accidents, general health, conduct records, etc.

A GUIDE TO THE DISCUSSION OF FACTORS INVOLVED IN THE MEASUREMENT OF PERFORMANCE RESULTS

Quantity of Work

Are his assignments completed on time?
Are there unnecessary backlogs, projects, reports?
How well does he meet output standards of requirements?
Does he usually do more than expected? Just the required amount but seldom more? Less than expected?

Quality of Work

How well does his work meet quality requirements?
Does he consistently do an excellent job? Are errors very rare?
Is he careless? Does his work only get by? Do you sometimes have to tell him to do a better job?
Is there any evidence of complaints from customers?
Any evidence of employee grievances, etc.?

Control of Costs

How is he with regard to budget planning and controlling expenses?
Is he sufficiently cost conscious?
Is he safety conscious?
Is he careful or wasteful with equipment, material, and manpower?

Author Wyland

• Discussing individual performance

The employee appraisal report form (Fig. 1) is first concerned with *performance*. This section is further divided into *results* and *methods*. The discussion of the appraisal committee at this point is aimed at the preparation of a narrative statement which will accurately summarize the conclusions of the committee with regard to the individual's *performance* of his job against the agreed-on description of his duties and responsibilities.

• Results obtained

At this stage of the discussion the concern is with such questions as: What has this person accomplished in measurable results? What is the quantity of his work? What is the quality of his work? What of the cost and time elements? The discussion here is *not* of what should be done in the future, or of *why* the results are as stated; the discussion is of the *actual accomplishment itself*. (See box, "A guide to the discussion of factors involved in the measurement of performance results.")

The use of specific factual data is highly important in the discussion of results obtained. Operating reports, cost summaries, audit reports, safety records, commendations or complaints from customers, evidence of employee dissatisfaction, and other factual data should be used in measuring the individual's achievements in his job.

In discussing the results of an individual's performance, specific examples should be given of (a) successful results and (b) results which could have been improved. These examples will tend to pin point the summary statement regarding results obtained in the job performance.

• Methods used

In discussing an individual's performance, the first question is one of the results obtained; the second question is one of the methods used. How well does he go about getting his job done? How well does he work with and through other people? How did the individual achieve what he did?

It must be noted that all of the discussion of *methods used* relate to the *results obtained*. The question at this point then is not one of whether the individual *can* or *will* delegate responsibility in getting the job done. Rather, the question is one of whether or not he *did* delegate. It is not a question of whether he *can* work with others, but *did* he in getting the results noted?

DISCUSSION OF METHODS

Planning and Organizing

How well does he plan his work—for today, tomorrow, and the future?
Are his subordinates well organized to perform their duties?
Does he anticipate changes and make necessary preparations for them?
Does he have strong individuals in key positions?
Are his promises objective and dependable?

Getting Along With Others

Is he able to inspire teamwork and direct a group toward a desired goal?
Does he treat his men fairly and impartially?
Does he use tact and diplomacy in getting along with others?
How well does he work with his associates? With customers, dealers, suppliers? With other outside people?
Is he sufficiently cooperative or is he inconsiderate?

Delegating Responsibilities

Does he give his men sufficient responsibility?
Does he give them authority to carry out the responsibility?
Does he supervise their work too closely?
Does he encourage group participation?

Development of Personnel

How well does he recognize and develop the capabilities of his subordinates?
Does he plan and arrange for constant improvement in himself and his subordinates?
Is he "training and development" minded?
Does he give recognition for good work?
Does he give constructive criticism?

The answers to questions in this category are highly important. If improvement in work methods can be made, there is no question about improved performance on the job and increased opportunity for growth and development. The box entitled "Discussion of Methods" lists factors to be considered by the appraisal committee.

In the discussion of the planning and organizing factors it is important that specific examples be used to illustrate the use of successful work methods or to illustrate where work methods could have been improved.

• Discussing personal qualifications

The next step in the conduct of the appraisal session is to discuss *personal qualifications* of the individual being appraised. This section of the appraisal report form follows the job performance section just discussed. The concern at this point is with the personal qualifications which the individual has demonstrated in performing his job. The attempt is not to analyze the individual psychologically. Rather it is to summarize his strongest and weakest personal characteristics in order to point up the areas where personal improvement can take place, and then to assist him in making such improvement. *There is no attempt to list and discuss all of his personal qualifications;* rather, there is emphasis on those characteristics which are pertinent to his job and the best interests of the company. A good approach in finding out "what he is like" is to have members of the appraisal committee indicate their views of the individual's strongest and weakest personal characteristics.

Discussion of personal characteristics may introduce some problems of semantics. It is important that all members of the appraisal committee proceed from a common understanding of what is meant by such characteristics as initiative, cooperation, emotional stability, etc. In order to meet this need, a guide for discussing personal qualifications has been prepared, and is included as part of Fig. 2, which is an outline for conduct of the appraisal session. It will not be necessary to discuss every individual in terms of all the factors listed, but it will be helpful to refer to the guide in discussing particular factors *as they are raised* by members of the committee.

• Discussing potential

Up to this point the appraisal committee has been concerned with evaluating what the employee has accomplished in his job, how he has done it, and the outstanding personal qualifications associated with him. After a narrative summary of these factors has been entered on the appraisal report form, the committee will turn its attention to a discussion of potential. It will be noted that this section of the report form follows the section on *personal qualifications.*

The purpose of this part of the appraisal is to obtain an estimate of the capacity of the individual to develop in his present job and/or advance to positions of increasing responsibility and authority. When all such estimates are completed, the company will have a good summary of its own management resources and will be able to determine the extent to which it can meet growth and replacement problems from within the present organization.

The questions for discussion at this point are: what is the potential for improved performance in the *present* position? What is the next logical step beyond his present position? Does he have further potential beyond the next step? After considering the individual's background and capabilities, the appraisal committee may indicate his capacity for advancement in such terms as (a) exceptional qualifications for advancement; (b) better than average qualifications; (c) average qualifications for advancement; or (d) does not qualify for advancement.

• Current status

If it is agreed that the individual being appraised has some potentiality for improvement or advancement, there should be specific notation of the next logical step for him. Consideration should be given to positions in other departments or divisions of the company. Further, there should be an indication of the individual's readiness for the next step indicated. It may be concluded that he is ready now, not quite

OUTLINE FOR CONDUCT OF APPRAISAL SESSION

1. Brief review of work history and personal data

2. Discuss individual job performance in terms of:

   a. Results Obtained

      (1) Quantity of work
      (2) Quality of work
      (3) Control of costs

   b. Methods Used

      (1) Planning and organizing
      (2) Getting along with others
      (3) Delegating responsibility
      (4) Development of personnel

3. Discuss personal qualifications in terms of:

   a. Knowledge of function
   b. Leadership
   c. Responsibility
   d. Analytical ability
   e. Ambition
   f. Emotional stability
   g. Decisiveness
   h. Coordination
   i. Resourcefulness
   j. Good health

4. Discuss potential

   a. In present position
   b. Next logical step
   c. Potential beyond next step

5. Discuss and agree on current status

6. Recommend specific development action and make plans for carrying out recommendations through the immediate supervisor

FIGURE 2

ready, or far from ready for advancement. If he is not considered ready for advancement, an estimate of the time required should be noted. If it is concluded that he has potential beyond the next step indicated, this also should be noted.

The chairman is now in a position to secure from the appraisal committee a summary statement of the individual's *current status.* It will be noted that seven summary statements of current status are provided on the appraisal report form. One of these statements will best represent the pooled judgment of the committee and should be checked on the report form.

A definition of each summary category is as follows:

1. Immediately Promotable. The individual can fill immediately a specific job at a higher management level.

2. Promotable with Further Training. The individual can fill a specific job at a higher management level with further training. Such training may be accomplished within a reasonable time interval.

3. Satisfactory Plus. The individual is supplying what can reasonably be expected on his present job and could accept additional responsibility and authority at his present management level.

4. Satisfactory. The performance of the individual is satisfactory, but there is need for improvement in certain specific areas. (These specific areas will be indicated by the committee in the "action" section of the appraisal report.)

5. Satisfactory Minus. The performance of the individual is not entirely adequate at this time, but he is considered to have potential for satisfactory performance if he makes improvement in certain specified areas.

6. Inadequate. The performance of the individual is inadequate at this time.

7. Decision Deferred Because New. The individual has not been on his present assignment long enough to determine whether or not he is performing his job in a completely satisfactory manner.

• Action

Everything done by the appraisal committee up to this point has been *for the purpose of arriving at a course of action* with respect to the individual being appraised. Without a specific course of action based upon the findings, the whole appraisal process becomes meaningless. In short, the heart of the matter is the action taken after the analysis of performance and personal qualifications.

In the majority of cases the action taken will involve leaving the individual in his present position, with specific recommendations for training and development in order to meet the needs and problems discussed. In all cases the recommendations should be consistent with the following major goals of personal development within the organization:

1. To help the individual realize that he has capacity to grow and develop, and to learn new and better methods.
2. To help the individual discover for himself where and in what manner he needs to develop.
3. To help the individual improve himself in certain management skills, as follows:
   (a) The ability to gather and weigh information
   (b) The ability to plan and organize his work
   (c) The ability to delegate authority and responsibility
   (d) The ability to make decisions
   (e) The ability to get along with people.

In making specific recommendations of *how* to attain the desired results, it is important that the appraisal committee keep in mind certain basic principles. Three of these are as follows:

1. People develop people. The key role in the development of an individual should be played by his immediate supervisor. It is the man-to-man contact in an organization that provides situations for growth and development.

2. People learn best from work experiences that are closest to them. In recommending a course of action for an individual, the appraisal committee should not look for a cure-all, but should begin with the immediate work situation and discover how it can be utilized to meet the needs and problems discussed.

3. People learn gradually. The recommended course of action should be achievable by the individual and should patiently recognize that most people cannot absorb too much at one time.

Some of the specific actions which can be taken to improve job performance and enhance progress in the company are as follows:

1. Assignment of the individual to another group or section in his own department.
2. Effect a temporary or regular change of duties.
3. Make a loan or exchange of the employee; transfer to or with other departments.
4. Give special assignments in technical or regular fields.
5. Set up coaching sessions by the individual's immediate superior.
6. Assign the individual to an established training program.
7. Refer the individual to psychological service for assistance on particular problems.
8. Appoint individual to recognized professional and technical committees.
9. Provide membership in professional or technical societies, and require systematic attendance and participation as a company representative.
10. Name the individual as an "understudy" for a particular position.

There are many other such actions which could be listed. These are sufficient, however, to show the need of making *specific* recommendations which are designed to meet the needs revealed in the appraisal.

It will be noted that the action taken must be consistent with the summary of *current status* discussed previously. For example, if the committee concludes that an individual is promotable with further training, the specific kind of training needed should be recommended. If the committee concludes that an individual is satisfactory but needs immediate improvement in certain areas, the specific needs must be summarized in the *action* section of the appraisal report form.

If the appraisal committee concludes that an individual is not properly placed in his present job, and could be better utilized in another job of equivalent classification in the same department or some other department, it should recommend the action to be taken. If the committee feels that the performance is completely inadequate and incapable of improvement, it may be necessary to recommend appropriate action in the best interests of the individual and the company.

After the committee has arrived at agreement on the statements to be included under the various sections of the employee appraisal report form, only two copies of the form should be typed by a confidential secretary and then submitted to members of the committee for signature. The original copy of the report will be returned to the chairman of the committee who in all cases is the immediate superior of the individual evaluated. The chairman will then review the report with the next highest level of supervision and so note such review on the report form. The report may be reviewed by other levels of supervision as considered necessary. The second copy of the appraisal report will be given to the personnel department for placement in the confidential files covering all employees.

The next step is a follow-up of the appraisal report in the form of an interview between the person appraised and his immediate supervisor, the chairman of his appraisal committee.

FOLLOW-UP OF APPRAISAL

THE post-appraisal interview between the appraisee and his "boss" is the key to a successful program of management development. Up to this point the process has involved the inventory and appraisal of the individual, and recommendations for his improvement. Now the man appraised actually begins to participate in plans for his own development. It is at this point that the careful supervisor can help both his subordinate and himself.

This informal and private discussion between the employee and his immediate supervisor is most essential in establishing mutual understanding of the development program and in promoting and maintaining good morale. These post-appraisal interviews should begin at the very top of the organization unit and proceed downward to all first-line supervisors.

While there will be many variations in the conduct of these interviews, it is important that all of them cover the following four items:

1. Explain briefly the Management Development Program in order to supplement information already furnished by way of employee publications, etc. Emphasize the opportunities which are open to those who qualify for advancement. Explain the nature of the opportunities facing the individual and why it is to his personal advantage to participate fully in the program.
2. Give the individual adequate recognition of his outstanding accomplishments.
3. Let him know exactly where he stands. Discuss the performance and personal qualifications sections of the appraisal report with him. Do not try to "whitewash" the report. Tell him the truth in a friendly and understanding manner.
4. Show him where it is felt he can improve himself, *and work out with him specific means of doing so.* This is undoubtedly the most important part of the appraisal procedure. If it is done properly, the individual will probably come to the same conclusions as made by the appraisal committee, and will be prepared to cooperate in following a specific program for his own improvement.

If the supervisor can manage to communicate the feeling that he is sincerely interested in the personal growth and development of his subordinates, and can enlist the best efforts of his men in their self-development, the success of the Management Development Program will be assured. ■

This article is adapted from a talk presented to the NEGA Gas Utility Managers Conference, held in Wianno, Mass., Sept. 15, 1959.

...management development

LILCO developed—
and uses—its own

Tailor-made management workshop

By WILLIAM T. HARPER, Eastern Editor

LONG ISLAND LIGHTING CO., with a long period of rapid growth behind it and forecasts of a greater growth in the future, has had to gear its operations and planning to that growth. This is true not only for LILCO plant but for LILCO people as well. Annually LILCO reviews both its organizational requirements and the people who will have to meet those requirements in the future.

In 1956, C. Y. Osburn, the LILCO vice president responsible for analyzing these requirements, found that management development, especially on the department manager level, would have to be stepped up to keep pace with the forecasts. This called for management training in depth. The practice of sending two or three managers at a time to the outside Utility Management Workshops around the country was too slow a process. In addition, these workshops were usually directed at a higher level of management than the level LILCO wanted to develop.

LILCO's solution to this problem was a management workshop tailored to its own needs and capable of training managers in groups of 20. At the same time it was appreciated that there could be no automatic process of developing managers. The best that could be done would be to give men with potential the tools with which they might help themselves.

The first step in setting up the program was the development of a basic outline of the subjects to be covered. This was done in consultation with company executives who had attended similar workshops at colleges and universities. The outline reflected their thinking of what subjects would be most beneficial to the group involved.

Next, A. L. Williams, training and education ad-

ministrator, conferred with Dr. Francis K. Ballaine, Dean of Adelphi College, located in Garden City, N. Y. Dean Ballaine is no stranger to training in industry, having been a consultant to such firms as Bankers Trust Co. of New York and Standard Oil of New Jersey among others. In addition, he is director of the Adelphi College Advanced Management Program and executive director of the Adelphi Research Center. The college undertook the project willingly, for as Ballaine asserts, "We feel we are fulfilling part of our function of serving the community by cooperating with industry in this manner. It also helps us because our business school faculty must stay alert to changes in industry practice."

Appropriate members of the Adelphi business school faculty, including Ballaine, were assigned to the program. Where desirable, the college instructors met with company executives to be briefed on company policy, practices and philosophy.

Originally the program was planned to be staffed entirely by Adelphi business school faculty. However, it soon became apparent that subjects such as public utility regulation, LILCO's selection and testing program, wage and salary administration, etc., could better be handled by company personnel. Under its present setup, the workshop teaching staff is about 65 per cent Adelphi personnel and 35 per cent LILCO's.

The workshop is of two weeks duration, Monday through Friday, from 9 a. m. to 4:30 p. m. There are four 1½-hour sessions each day. The classes are held at a local country club which has excellent meeting facilities separated from the normal club activities. Participants are not expected to partake in normal company business during the workshop.

The first workshop was held in January 1957 and two additional groups attended during that year. Two more groups attended in 1959. In all, a total of 97 LILCO managers and supervisors participated in the program.

The following curriculum has evolved from the original outline which was modified from time to time as LILCO gained experience and benefitted from the advice of each group that attended the course:

- **General management—7 sessions**

This portion of the workshop consisted of such subjects as organization, the manager's functions, decision making, policy and procedure and supervisory development. It was conducted by Adelphi instructors.

- **Manpower management—5 sessions**

Dealing generally with company personnel and labor relations policies and procedures, this portion of the program was conducted by LILCO's personnel manager and labor relations administrator.

- **Administrative problems—11 sessions**

The participants are required to read selected cases from "The Administrator" by Glover and Hower prior to attendance at each day's session. Through analysis and discussion of specific cases, they are stimulated to develop conscious awareness of the complex interrelations between human, technical and economic facts in a business organization. In discussion they have the opportunity to propose responsible lines of administrative action in connection with the cases presented. And, at the same time, they have the opportunity to listen to others as they make their own proposals for effectively meeting the situation. This portion of the workshop is conducted by the Adelphi faculty.

- **Public utility regulation—4 sessions**

Conducted by LILCO's senior attorney, such items as the economic and legal background, service regulation, rate regulation and rate base are discussed.

- **Public utility accounting—4 sessions**

This portion of the workshop is shared jointly by Adelphi and LILCO instructors and deals with basic accounting principles, reading financial statements and the use of accounting as a managerial tool.

- **Economics—4 sessions**

An Adelphi instructor discusses the framework of the American economy, government regulation and control, and the problem of inflation.

An important feature of the workshop is the luncheon sessions. Each day an officer of the company addresses the luncheon sessions on a subject of current interest to him and the office he holds. Informality is the keynote and many questions are asked. This gives the members of the workshop an invaluable insight, brief as it is, of the responsibilities and concerns of the top management team.

Graduation exercises are conducted on the last day. The students are presented with a diploma and there is a graduation address by an officer of the company. They are encouraged to bring their wives to the ceremony and the reception that follows.

At the end of the two-week training, each participant fills out a questionnaire asking for his opinion of the workshop. The reactions differ but three comments hold true generally.

1. They feel that they develop a broader concept of their jobs—from a department to a company viewpoint.

2. The participants feel that they get better acquainted with their counterparts in other departments and the operations of those departments.

3. Their thinking is stimulated through self-analysis provoked by the exchanging of opinions and the introduction of new ideas.

In evaluating the workshops, A. L. Williams feels that these comments are a major justification for their continuance. "The majority of questionnaires," he said, "gave honest reactions. When the participants thought specific sessions were impractical or too basic, they told us so, and we did something about them before the next group started."

Williams also pointed out that 21 of the first 50 participants had been promoted since they had attended the workshop. "This can be an indication of either the need for or the effectiveness of the program. I prefer to think it indicates both. The important things are that our people were prepared for promotion and we had a pool to choose from." ■

. . . management science

Management science solves utility problems

By ARTHUR H. SCHNEYMAN, Staff Engineer
Transmission & Distribution Department
Washington (D. C.) Gas Light Co.

Here is a blending of the elements of management and the scientific method. Author Schneyman presents case histories of the application of the scientific method to six different management problems in his company's system to illustrate this concept.

MANAGEMENT involves the *planning, organizing, directing* and *controlling* of the efforts of others in order to achieve a stated objective. These are the elements of management.

Planning—Planning is the determination of a course of action to achieve a desired result. Planning, then, involves such activities as: (1) setting objectives; (2) forecasting; (3) establishing policies; (4) initiating programs; (5) making schedules; (6) developing procedures; (7) formulating budgets; (8) conducting research; and (9) the allocation of resources so as to maximize attainment of objectives.

Organizing—The resources (men, materials, machines and money) available to the manager for accomplishing his objectives are formed into an organization structure. Organizing involves: (1) the process of identification and grouping of work; (2) the definition and delegation of responsibility and authority; and (3) the establishment of relationships.

Directing—Directing is the process of setting plans into action so as to move toward an objective. This involves: (1) coordinating; (2) balancing; (3) timing; (4) integrating; (5) motivating; (6) selection; (7) communication; and (8) training. Direction includes the day-to-day job of executing plans and operating the business.

Controlling—Control is the process of guiding plans on course to attain objectives. It involves: (1) determining where you want to go (objectives); (2) observing to see that you keep on course; and (3) taking necessary actions to correct any significant variations. The concept of management control is the same as a simple feedback circuit used in control devices called servomechanisms.

Management problems, therefore, are problems dealing with the elements of planning, organizing, directing and controlling.

SCIENTIFIC METHOD

THE scientific method is the systemized approach to problem solving used in the scientific and engineering disciplines. With some degree of overlapping as to definition and sequence of attack, the scientific method of problem solving generally involves five steps: (1) definition of the problem; (2) collection and analysis of data; (3) selection of a solution; (4) test of the solution; and (5) control of the solution.

Define the Problem—Problem symptoms are examined to identify basic causes and determine the *objective* of the problem solution. A *model* of the system is formulated in order to see the factors and relationships involved. In some cases, hypotheses of causes may have to be developed.

Collect and Analyze Data—Data are collected to *estimate the parameters* contained in the model. In some approaches data are collected and analyzed in order to explore various alternative feasible solutions so that eventually the best solution can be selected.

Solve the Problem—Inserting parameter estimates in the model yields the solution. If alternative feasible solutions are involved the parameters are inserted for each feasible solution and the various outcomes examined in light of an appropriate measure of effectiveness so that the best solution will be selected.

Test the Solution—The solution is tested by whole or partial implementation. Partial implementation tests can be made by pilot studies, designed experiments, solving by another method; retrospective simulation and projected simulation. The results of the tests are used to validate the solution.

Control the Solution—A means should be developed to signal when conditions and results fall beyond the range of values within which the solution is consid-

ered satisfactory. Control charts with statistically determined limits are often used to identify significant variations from expected results.

Management Science—Management science, therefore, may be thought of as the application of the scientific method to solve problems of planning, organization, direction and control.

For each of the elements of planning, organization, and control, illustrative applications in the Washington Gas Light Co. are presented. Examples of applications in the area of directing thread through each of the examples and, for this reason, are not presented separately.

Washington Gas Light Co. is a privately owned public utility distributing natural gas to about 500,000 users over a 450-square mile service area of metropolitan Washington, D. C. The territory served includes the District of Columbia and adjacent areas in the states of Maryland and Virginia. An underground network of 3600 miles of gas mains, and more than 4500 miles of gas service pipe and related components, are used.

The company strives to provide the highest quality of gas service to its customers at the lowest reasonable rates commensurate with the maintenance of attractive earnings for its investors and a high order of job security for its employees.

About 25 per cent of all company expenditures are incurred by the transmission and distribution department, which is the setting for most of the cases presented. This department is responsible for the installation, maintenance and operation of the gas distribution system. One of the objectives of this department is to perform these functions at minimum cost so as to maximize company profit and rate of return on investments in gas plant facilities. This is the motivating force behind the management science applications presented in the next section.

MANAGEMENT SCIENCE APPLICATIONS

• Case 1—Planning

The objective of this problem is to provide a decision-rule for use by field personnel so that an economical arrangement of gas service will be installed. Two alternatives are possible: (1) a separate gas service line may be run for each house; or (2) a common service line may be run between two adjacent houses and a separate branch line run to each dwelling in a "T" arrangement.

Initial installation savings are realized by the branched arrangement but these can be offset by additional future maintenance costs because the services are branched. The following economic model was formulated:

$$L = \frac{\Sigma_j S_j - P_r P_s \Sigma_i P_i C_i}{K} \qquad (1)$$

Where:

$L = L_1 - L_2$ = Difference in total length of the branch, L_1, and total length of two single services, L_2, in feet.

$\Sigma_j S_j$ = Algebraic summation of each type, j, of initial installation savings realized by branching.

P_r = Probability of exactly one repair on the outside service pipe of the branched arrangement.

P_s = Probability of this repair requiring the shut-off of gas on the service.

$\Sigma_i P_i C_i$ = Summation of each type, i, of future additional maintenance cost, C_i, multiplied by its probability of occurrence, P_i.

K = Installed value of one foot of service pipe eliminated by branching.

The initial savings, cost data and unit footage values were obtained from company records. The probabilities of occurrence of future cost were obtained from a sampling of maintenance records or by estimates. It was found that this model is relatively insensitive to the probability values. In fact, the result is only slightly altered over a wide range of probabilities. The solution revealed that the branched arrangement can be as much as 5 ft longer than the total length of the two individual services.

A test of the solution was conducted by sampling recently completed installations in the field and determining the amount of footage that would have been saved had this new policy been in effect.

The solution will be controlled by surveillance of the cost parameters and by random sampling of field installations to assure compliance with the policy.

• Case 2—Planning

The objective here is to develop a sound policy for the replacement of motor vehicles. The model used is taken from economic replacement theory which tells us that the optimum point of replacement is when the cumulative average annual cost is a minimum. The cost elements considered are: (1) capital consumed or wastage, W; (2) interest, I; (3) repair costs, r; and (4) costs arising from unserviceability, u. Some models consider other elements of costs. The average cost of a group of vehicles in their ith year, C_i, is:

$$C_i = \bar{W}_i + \bar{I}_i + \bar{r}_i + \bar{u}_i \qquad (2)$$

The cumulative average annual cost after n years of life is:

$$\bar{C}_n = \frac{1}{n} \Sigma_i C_i \qquad (3)$$

The value of n which minimizes $\bar{C}_n$ is the optimum replacement interval.

Data were gathered from fleet records and other sources in order to estimate these parameters. *Capital consumption or wastage* is the original purchase price less the salvage value at the end of the first year. In succeeding years it is the difference in value between the beginning and end of the year. Capital wastage (true depreciation), then, decreases with vehicle age. *Interest* is the annual cost of borrowing an amount of money equal to the value of the vehicle at the beginning of each year. Interest decreases with age. *Repairs* (excluding accidents and routine maintenance) tend to increase with vehicle age. *Unserviceability* costs are the cost of out-of-service time reflected in manhours lost, the need for reserve vehicles

or for rental of substitute vehicles. These costs also tend to increase with vehicle age.

Because the value of money is a function of time, care must be taken to express all cost parameters in constant dollars. This was achieved by taking all data from the same preceding year. Vehicles were also grouped into various mileage classes.

Substituting in the model for vehicles in the same mileage class and plotting $\overline{C}_n$ against age of vehicles yielded "U"-shaped curves. These curves generally displayed a broad minimum in the four- to six-year range.

Since these findings were in close agreement with current practices, it was necessary only to watch the various cost parameters in order to control the solution.

• Case 3—Planning

The problem to be solved in this case is the determination of the optimum number of each of three types (sizes) of maintenance crews. A minimum cost solution is required such that fluctuating workload demands can be satisfied and a system of priorities governing the waiting-time for each job is not violated. Generally, each size crew is capable of completing each job type, but these crews vary in their effectiveness (cost) for completion of each type of job.

Problems of this structure occur frequently in industrial and utility situations and are classified as waiting-line (or queuing) problems. Analytical models have been derived for a variety of types of waiting-line problems. Simulation or Monte Carlo techniques, however, can be used to solve any queuing problem for which the required data can be collected.

Because of the complexity of this problem and the availability of a medium-sized electronic computer, a Monte Carlo type of solution was selected. This technique involves essentially setting up a model of the real situation, putting it in a particular state and then playing the game of operating the system. Appropriate records are kept of all decisions (plays) and their results in order to measure the over-all effectiveness of the given arrangement. Other arrangements are postulated and the game is replayed a number of times until an optimum arrangement is found.

The data required are: (1) job arrival statistics; (2) job completion statistics; and (3) quantitative statements of the rules governing how long jobs can wait before assignment to a crew.

The number, type and distribution of time intervals between job arrivals can be obtained from a sampling of incoming work. The man-hours for each crew type to complete each job type were obtained from job production reports (see Cases 5 and 6) and found to be normally distributed. These man-hours were costed to determine the optimum size of crew for each job and the penalty cost for non-optimum crew assignments. The priority rules are stated in terms of per cent of jobs allowed to wait various periods of time. The basic model was formulated and tested by developing a simplified small scale version of the problem and solving by hand.

Our next step will be to program the full scale model and test it retrospectively by using the present crew deployment. By statistical techniques, the validity of the model will be determined by comparing the computer results to actual experience.

Alternative crew deployments will be substituted and the model solved for the optimum arrangement of crews under the conditions fed into the program. This will be followed by implementation of findings.

The solution will be controlled by computing monthly dollar losses due to non-optimum dispatching and plotting this measure of effectiveness on a control chart.

• Case 4—Organization

The problem objective in this case is to determine the amount of first line supervision required over 3-man maintenance crews. At the time of the study each such crew had a full-time foreman. The model is, in fact, the elements of management itself. A classification scheme was devised to identify the managerial and non-managerial activities in which foremen can be engaged. The measure of effectiveness used was the percentage of time that a foreman is actually engaged in necessary managerial activity.

A random order sampling plan was used to determine the percentage of foremen's time spent on each of the activity categories. An observer arrived at a job site at a random time and made an instantaneous observation of the activity of the foreman. A sufficient number of observations were taken over all foremen to assure a statistically reliable sample.

A hypothesis was then formulated that one foreman could probably supervise two maintenance crews jointly.

A pilot test was initiated to verify this hypothesis. Several foremen were furnished with a radio-equipped vehicle for travelling between and communicating with his two crews. The primary purpose of the pilot run was to determine if the partial absence of the full-time foreman had any significant effects on crew productivity. After four months, the production of the partly supervised crews was compared to the performance of these same crews when they had a full-time foreman. Statistical tests indicated no significant effects in crew performance.

With completion of the pilot test, all 18 crews involved were reorganized under the part-time foreman arrangement. A significant net savings is being realized from this application.

The extra foremen were absorbed by eliminating "acting" foremen, retirement and the creation of additional crews (organized as a result of another management science application).

The solution is controlled by a program (see Case 5) of continuous crew performance appraisals.

• Case 5—Control

This case concerns the problem of controlling the *quantity* output of maintenance crews. The objective of the solution is to increase the output of crews engaged in maintenance work so that unit maintenance costs can be reduced. Two models are utilized:

Arthur H. Schneyman was graduated from Renssalaer Polytechnic Institute in 1950 with a Bachelor's degree in Management Engineering. In 1959 he earned his Master's in Engineering Administration from George Washington University. Schneyman is a member of the American Society for Quality Control (senior), the Operations Research Society of America, and the Institute of Management Science.

(1) the servomechanism concept of control; and (2) non-financial motivational concepts.

Servo-theory requiries the following steps: (1) setting standards; (2) measuring actual activity; (3) comparing actual with standard; (4) analyzing for causes of significant deviations; (5) taking of corrective action and (6) evaluating action by feedback to the measurement phase.

Non-financial motivational concepts tell us that people perform better when: (1) goals or expectations are known to them; (2) knowledge of results is revealed to them; (3) praise is given; and (4) competition is stimulated.

Basic data were acquired by the initiation of a production report form to be prepared daily by crew leaders. To insure reliability of this information a statistical quality control program was developed (Case 6). Because of the high volume of work involved these data were collected and summarized monthly by electronic data processing equipment. Average manhours to complete each job and related information was obtained in order to: (1) measure actual activity; and (2) set manhour standards for each job performed by each type of crew.

Instantaneous random sampling of maintenance crew members was employed to estimate the parameters required for setting job standards. Statistical theory was employed to provide a sample of sufficient reliability. The standard manhours, S_{ij}, to complete the ith job by the jth size of crew was calculated from the following model and the results released to all crew leaders as statements of expectations.

$$S_{ij} = \bar{H}_{ij} W_{ij} (1 + U_{ij}) \qquad (4)$$

Where $\bar{H}_{ij}$ = Average manhours to complete ith job by jth crew type.

W_{ij} = Percentage of total sampling observations in which members of the jth crew type were found working.

U_{ij} = Percentage of total sampling observations in which members of the jth type of crew were not-working due to unavoidable reasons.

Comparisons with standard were accomplished by computing an individual crew percent performance, P_c, each month according to:

$$P_c = \frac{\sum_i \sum_j n_{ij} S_{ij}}{\sum_i \sum_j n_{ij} H_{ij}} (100) \qquad (5)$$

Where n_{ij} = Number of jobs of ith type completed by this crew when it was of the jth size.

H_{ij} = Actual average manhours for this crew to complete the ith job type when it was of the jth size.

A crew performance feedback procedure was initiated by releasing to each crew leader his monthly per cent performance. This was done through normal organizational channels. Competition was stimulated by accompanying each monthly figure with the average performance of all similar type crews. These communications are kept by the crew leader himself on a performance graph so that trends will become apparent.

The solution was tested by complete inplementation. Since implementation maintenance crews have actually produced 1.56 per cent more output per month and maintained this continuous rate of improvement for over 24 months.

Control is accomplished by following various sets of average crew performance on monthly control charts with limits set so that they will be exceeded by chance only 5 per cent of the time.

• Case 6—Control

This case deals with the control of the *quality* of production reports prepared by field personnel. It was determined that the acceptable quality level of reporting was that a maximum of 5 per cent of the jobs reported could contain one or more errors. This was the problem objective. Here, again, the solution model employed was the servomechanism concept of control.

An error was defined and a means developed for inspecting each of the nine items required in a job report. An historical sample was taken to obtain a measure of the present quality level. The results indicated that much improvement was needed.

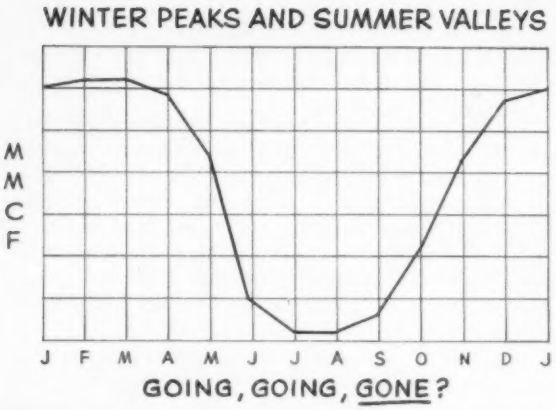
A daily sampling inspection scheme was developed to serve as a means for: (1) generating error data; (2) continuously measuring the quality level; and (3) evaluating the effectiveness of corrective actions.

Through initial training, feedback of errors found, analysis of errors by types and personnel concerned and praising of good reporters, the error rate was reduced to less than the acceptable level. This was accomplished within three months after the quality control program was fully underway.

Having solved the problem by attaining the quality objective, the solution is controlled by continuing a daily sampling inspection of production reports and posting the results of each sample on a statistical quality control chart. The lower limit of this chart is zero and the upper limit is 13 per cent, which, if exceeded, is in all probability due to an assignable cause rather than chance sampling error. This process has remained in control for almost two years.

The message contained in this presentation is this: The engineer is armed with knowledge and experience in technical applications of the scientific method. He needs only to recognize that this powerful tool is at his disposal for the solution of management problems of planning, organizing, direction and control. ■

This article is adapted from a talk presented to the Washington, D. C., chapter of the American Society of Mechanical Engineers recently.



Battelle grants Piston license To Robertshaw

By WILLIAM T. HARPER, Eastern Editor

THE advancement of the natural gas industry into the residential air conditioning field took what many believe to be its biggest step early last month when it was announced that the Robertshaw-Fulton Controls Co. had been granted exclusive license to manufacture and market the Free Piston Refrigerant Compressor.

T. T. Arden, president of the company which has its headquarters in Richmond, Va., said in an exclusive interview with *GAS Magazine* that this compressor would offer "a very real hope for genuine competition" to the manufacturers of gas powered air conditioners. Continuing he added, "We hope to put the compressor unit in the manufacturers' hands at about the same price as electric motor driven units. It will be competitive in first costs, dependability, and quietness of operation. And test figures indicate that this unit can operate for less in most parts of the country."

The free piston compressor was developed by scientists at the Battelle Memorial Institute in Columbus, Ohio. Arden stated that the work on this project started over four years ago. It was about that time that the American Gas Association put the following question to the people at the Institute: "How can the potential energy in natural gas be transformed into a refrigerating effect with high efficiency and low first equipment cost in such a way as to be attractive for residential air conditioning service?"

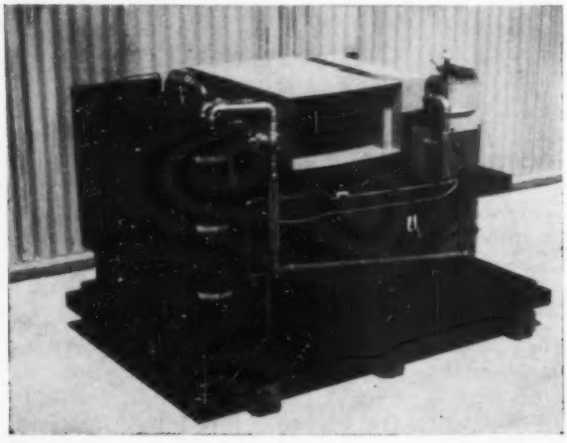
When the Battelle people agreed to try to find an answer to this question, the A.G.A. (under the air conditioning research division of its PAR program) allocated funds to go into the project's development. The ensuing research resulted in the free piston compressor. The patents for this unit, as issued, will be owned and controlled by the Battelle Development Corp., a division of the Institute. The B. D. C. will in turn grant exclusive license of these patents to Robertshaw-Fulton, giving it the right to grant sublicenses, to manufacture, use and sell the unit throughout the world in sizes up to, but not including, 20 tons of refrigeration capacity.

Several prototypes have been built at the Institute and have successfully operated a typical central air conditioning system such as is used in homes. Robertshaw-Fulton is sponsoring continuing development and research work at Battelle and will devote substantial finances of its own. "You can safely say," Arden told *GAS Magazine*, "that Robertshaw will be spending an additional $8½ to $10 million to bring this unit to market."

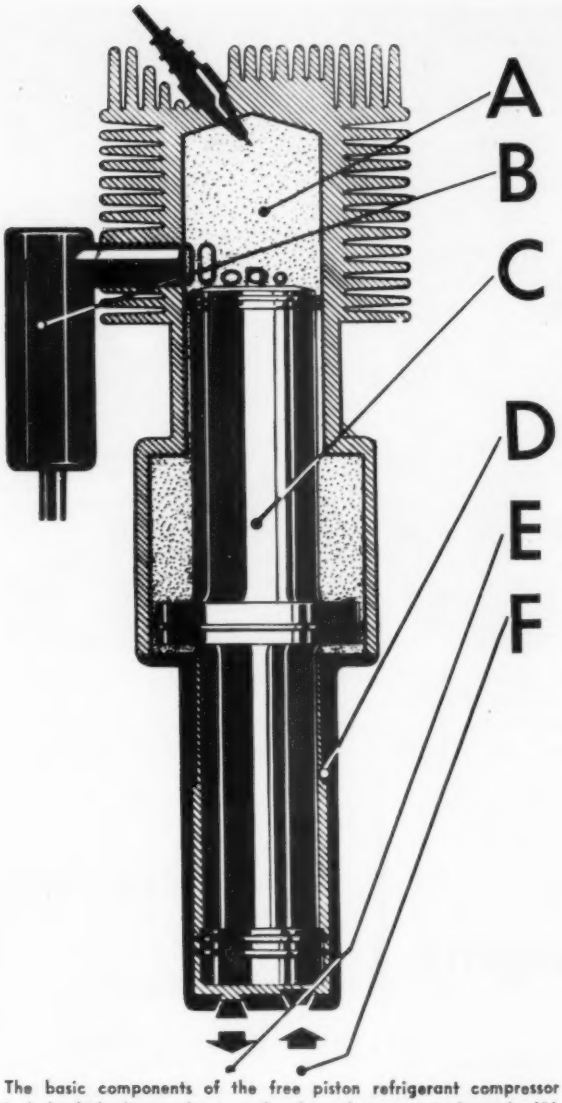
When asked if this project meant that Robertshaw-Fulton might itself be going into the direct manufacture of air conditioning units, Arden was emphatic in his denial. "We have no intention of so doing. We simply want to be able to supply all air conditioning companies. We want to give them a neat, compact package just as cheaply as they can buy electrically driven units. Robertshaw has been, and will remain, only a supplier of component parts whether it be controls, compressors, etc."

The company at first hoped that the compressor could be manufactured in a part of its Pittsburgh, Pa., division. "But," Arden revealed, "when market analysis showed us the possibilities of the sale of one million residential central air conditioners annually over the next five years, we decided we would have to build a separate plant and set up a new division to handle what we hope will be our share of the load." That "share of the load" for Robertshaw-Fulton is expected by Arden to be at least one-third and this will mean a new business for the company of a minimum of $35,000,000 in annual sales.

The free piston refrigerant compressor is still at



Shown here is a prototype of the free-piston air conditioning unit with the housing removed. The gas-fired free-piston refrigerant compressor is shown at the extreme right of the unit.



The basic components of the free piston refrigerant compressor include (A) the combustion chamber where gas is burned; (B) muffler; (C) the "free piston" that compresses the refrigerant on the down-stroke; (D) compressor; (E) refrigerant-to-condenser outlet valve; (F) refrigerant-from-evaporator inlet valve.

least a year away from the market in Arden's opinion. The first models to be commercially available will be in the three to six-ton range for central home air conditioners and smaller units for automobiles. The three-ton units were described by Arden as being about the same size as an ordinary homeowner's lawnmower. The compressor units are designed to operate on natural gas, liquefied petroleum gas, and with minor modifications, automotive gasoline. Arden said he expects the natural gas models to be marketed first but that LPG models will follow shortly. "The only difference in the two," he offered, "is in the fuel injection system as the fuels have different Btu contents."

The reason for the delay in marketing free piston compressors is Robertshaw-Fulton's insistence in a competitive product. "It's the performance factors of this unit that will make gas air conditioning every bit the equal of electricity," Arden commented. "For instance, we've got to get the piston as close to absolute balance as is possible.

"The last of the prototypes that we received from Battelle was close to this. Still, we feel that it will take another year of engineering development. We want to spend the next cooling season field testing it. We're going to work with a dozen gas utilities during the coming summer in so doing."

Even with another year's development ahead, Arden reports that present tests show that "operating economies are expected to be unusually good." The biggest reason for this is the simplicity of operation of the unit. Unlike conventional electric motor driven and engine driven compressor units, the free piston compressor has, with the exception of two pressure-actuated valves, only one moving part—the piston itself. This eliminates such things as flywheels, wrist pins, connecting rods and bearings, crankshafts, and main bearings. And naturally, the elimination of these parts also removes the necessity of their lubrication and maintenance. The piston, which then is "free" as it bounces up and down within the cylinder, does not then need such closeness of tolerances either, thereby cutting down additionally on manufacturing costs.

Added to this is the fact that the free piston compressor utilizes proximity firing. This in turn does away with the need for a timing device such as a distributor. With the combustion of gas taking place in one end of the cylinder and the refrigerant being compressed at the other, the resulting cooling action is then the same as in conventional air conditioning units. The free piston compressor also operates with any of the common refrigerants in use today.

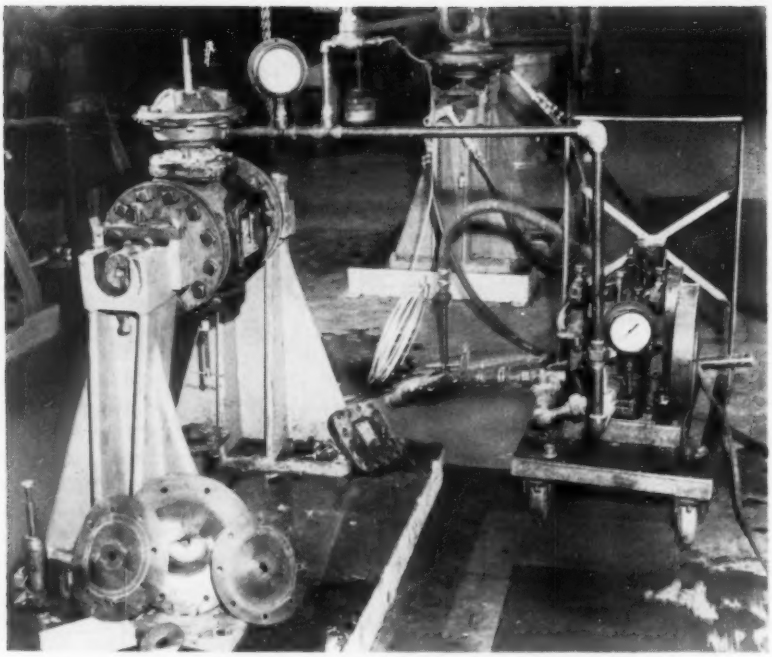
As Arden said, his company expects one-third of the residential air conditioners sold over the next five years to be equipped with gas-fired free piston refrigerant compressors. That is roughly 1½ million new users of natural gas. Needless to say, this will go a long way toward ending the summer-winter peak-valley problems that presently beset many gas utilities.

"It is exciting news for the gas industry that a great name, Robertshaw-Fulton, has now been added to the other great names—Arkla, Bryant, Carrier, York, Trane, Surface Combustion, Ready-Power, Weatherbuster, Comfortemp—engaged in developing, producing and marketing gas air conditioning equipment.

"Licensing of Robertshaw-Fulton to produce the entirely new free-piston gas engine compressor unit is particularly gratifying to us at A.G.A., since the design was developed through A.G.A.'s PAR Research Program.

"The unit should do much to strengthen further the competitive position of gas in the vital air conditioning field. Robertshaw-Fulton may therefore be assured of the gas industry's keen interest and full support in bringing this important new product to market."

C. S. STACKPOLE



Safety tests for gas regulator diaphragms are conducted by Reynolds in this homemade device, consisting of a steel bowl of 7-in. ID fed by a hydraulic pump. One diaphragm material tested has successfully withstood a pressure of 980 psi, or a total thrust of 23,520 lb on an effective diaphragm area of 24 sq in.

Safety testing gas regulator diaphragms

By GEORGE C. HUGHES
Reynolds Gas Regulator Co.

SOME half a century ago, an Indiana farm boy tried gas heat for incubating chicken eggs. He needed a slow oven heat 24 hours a day. In the daytime, he would watch the gas flame, and when its size changed because of changing pressure in the supply line, he would pinch or open a valve to maintain a steady supply of gas. However, at night, when he wasn't there to watch the flame, gas pressure would build up and cook the eggs.

So he built a simple contraption that had all the basic parts of a modern gas regulator—inlet and outlet connections; orifice and valve; mechanical linkage; a means for counterbalancing pressure; and a diaphragm, for which he used a piece of sheepskin.

The farm boy's name was M. B. Reynolds. He subsequently quit farming and in 1892 founded the Reynolds Gas Regulator Company.

Reynolds soon found that dry sheepskin was not an ideal diaphragm material. It was not impermeable. It dried out fast and cracked easily. In fact, the diaphragm was the weakest link in the first gas regulator.

The weakness of the diaphragm also remained a problem when later specially treated leather was used throughout the industry. Even though new diaphragms showed a given tensile strength, they might still weaken when placed in actual service. This poses a certain safety hazard because with a sudden upsurge in pressure as a result of some mechanical failure, the diaphragm must be able to absorb the full pressure, which in some cases may reach 1000 psi.

The ideal solution came with the development of synthetic diaphragms. Synthetic rubber coatings are now available that make it possible to operate diaphragms in any type of gas—manufactured or natural—without loss of strength or other undesirable qualities. Today we consider the diaphragm among the strongest parts in the regulator.

We have developed a special test at Reynolds to make sure that we select the proper diaphragm material for every one of our regulators. Pressure ratings of the many types of standard Reynolds regulators range from about ½ psi to 500 psi. On some specials, pressure ratings may be even higher.

From a design point of view it is desirable to have a thin diaphragm material because generally it has better flexibility, greater sensitivity and less hysteresis than a thicker material. However, with increas-

ing thinness we are liable to sacrifice some strength. Through our tests we can determine the maximum pressure that a particular diaphragm and a diaphragm plate can withstand without rupture.

For these tests we use a steel bowl with a 7-in. inside diameter. The diaphragm plate has an outside diameter of 4 in., and is ⅛ in. thick. Hydraulic pressure is fed to the bowl through a ½-in. stainless steel pipe.

In theory and for all practical applications the effective diameter of a diaphragm can be calculated as that diameter which falls half-way between the outside diameter of the diaphragm plate and the inside diameter of the diaphragm case.

In the case of the test procedure cited above, the effective diameter was calculated half-way between the 4-in. outside diameter of the diaphragm plate, and the 7-in. inside diameter of the steel bowl, or 5.5 in. The effective diaphragm area was then calculated to be 24 sq in.

One-pound per square inch pressure would consequently develop a total thrust on the diaphragm of 24 lb. Five pounds would develop a diaphragm thrust of 5 times 24 or 120 lb.

As an example, we recently conducted a test with a Buna-N coated nylon diaphragm with a thickness of 0.125 in. The rated Mullen Burst strength of this material was 725 psi on a 2-in. orifice. The material successfully withstood a pressure of 490 psi. If we multiply 490 by the effective diaphragm area, we are able to conclude that the total thrust against the diaphragm in this particular test equaled 11,520 lb per total thrust.

The best test results which we were able to obtain with this testing procedure was on a Buna-N coated fabric, styled Reevecote 7270, which had a thickness of 0.093 in. and a rated tensile strength of 900 x 800 lb and a Mullen Burst Test strength of 2000 psi on a 1¼-in. orifice. Under the same test conditions this material successfully withstood 980 psi or a total thrust of 23,520 lb. To secure the diaphragm against pulling away from center stem or out from underneath the plates because of extreme pressure that cups the plates, it was necessary to substitute ½-in. thick stainless steel upper plates for the standard ¼-in. thick plate. The ½-in. steel plates had a graphonic finish which also helped in preventing the diaphragm material from pulling out.

In the development of new designs or types of diaphragms, we cooperate closely with our supplier of diaphragm material, Vulcan Rubber Products Division, of Reeves Brothers, Inc. We submit our design drawings and specifications to the Reeves-Vulcan engineers who operate a special laboratory for rubber-coated fabrics at the company's Buena Vista, Va., plant. Reeves then provides us with samples, which we submit to laboratory tests, as well as to service tests in prototypes of the regulators. The final selection of the material is based on prolonged satisfactory performance in the prototype. ■

Atlanta Gas installs centralized control board at propane plant

To help alleviate those manpower problems that beset distribution companies during days of peak operation, Atlanta Gas Light Co. has installed a centralized control board at its Gasco propane-air plant in southwest Atlanta.

Measuring 12 ft long and 7 ft high, the board allows one man to see what's happening throughout the $2,630,000 plant and take necessary action. It also allows this same man to do all the mixing of the propane-air with incoming natural gas.

The peak use of this peak-shaving plant came in the record cold winter of 1957-58 when it was operated 19 times. As a result of the constant strain on manpower for such extensive emergency operations, the board was designed and put into use.

Costing less than $600, it was installed in time for the heating season of 1958-59 and has proved satisfactory in every way. There was no cost of instruments in setting up the board, only the cost of the board itself and installation of instruments already in use elsewhere.

A row of 17 lights across the top right of the board indicates whether the compressor engines in the main building are running. A shutdown on any engine immediately results in a light going out and informing the operator.

Below these lights are two series of three orifice meters, one series measuring the propane-air gas that is being made and the other the amount of natural gas going by the plant.

Other dials and gauges on the board keep the operator informed about the air pressure at all stages, temperature of the air and propane, and oil and steam pressure.

The plant was built in 1946 and first used in January 1947. Production capacity at that time was 1 MMcfh of natural gas equivalent with the plant consisting of 14 tanks and seven compressors.

Several expansions have increased capacity to close to 14 MMcf per hour with 98 tanks and 17 compressors.

GAS uses electronic data processing to service reader requests

Central computer, here being controlled by two technicians, rearranges information on magnetic tapes to sort out that which is desired by the manufacturer. It also provides an accuracy check of the tapes. In the background of this photo are the tape handlers.

This high speed printer "reads" the information on the tapes and prints it at a rate of 600 lines per minute. Here, James E. Guertin (right) chief engineer at the Computer Center, and GAS' eastern editor, William T. Harper, check over a page of inquiry request information.

BEGINNING with this issue, GAS Magazine will use facilities at the Computer Center of the University of Pennsylvania to process its Readers' Service cards on a UNIVAC I electronic data processing system.

GAS is the only magazine in its field with such service for readers. BUTANE-PROPANE *News*, a sister publication of GAS, is the only other magazine in the natural gas and petroleum industries with this service.

Benefits to readers of GAS will be many. Primary advantages are speed, accuracy, and analysis of the reader-inquirer's interests.

Consider the speed UNIVAC offers. In "reading" a metallic magnetic tape, one of the components of the system — a high speed printer — reads out 600 lines per minute. Each of these lines can contain 120 characters!

The probability of electronic error is low. Built-in checking circuits monitor the apparatus. This checking system also finds and eliminates human errors. Experience has shown that chances of an error going undetected are one in millions.

GAS' UNIVAC program will help manufacturers, too. For instance, one thing the system does is automatically arrange all inquiry requests by city and state. Thus, if a manufacturer wants the number of people in Arizona who expressed interest in his product, UNIVAC tells him.

By using this facility, GAS brings readers and manufacturers together via a non-commercial, neutral source.

Operation of the UNIVAC is relatively simple. GAS' Readers' Service cards are now addressed to a Post Office Box in Philadelphia. They are picked up daily by Computer Center personnel. Card-held information —name, complete address, title of sender, interests, etc.—is quickly transferred to magnetic tapes by a Unityper II. This device simultaneously prepares a typewritten visual copy for checking purposes.

Magnetic tapes are then taken to the central computer and placed on one of 10 tape-handling machines. There, tapes are tested for accuracy. If a Unityper operator made a mistake, the central computer logs these "exceptions." Correction follows.

Another electronic marvel used in GAS' program is S.P.I.T. (Selectively Print Items from Tape). This is a newly developed random access unit. It can search and select at 3000 cards per minute.

Once the tape is known to be accurate and processing is completed, it is taken to a high speed printer. This device prints out pages of information at a rate of 600 lines per minute.

Pages from the high speed printer are ready for mailing to the manufacturer. He gets a complete list of those interested in his product. At the bottom of the last page is a numerical count of the number of inquiries a particular product has received from the current issue of GAS. A second number reports the cumulative number of inquiries received to date. ■

SGA offers distribution course

SOUTHERN GAS ASSOCIATION has prepared a comprehensive Home Study Course in Natural Gas Distribution. It was ready for use on Jan. 1.

The course is relatively nontechnical and is designed for the gas company employee with high school training, but with a working knowledge of math and science. Though prepared for SGA member companies specifically, it is couched in language and objective to permit it to be an invaluable aid to gas distribution companies all over the country.

The course was a project of SGA's Distribution Section, with Carrington Mason (Houston Natural) as chairman. Assisting him were M. L. Bird (Lone Star Gas, Dallas) and C. L. Morgan (United Gas Corp., Houston).

Author of the 12-chapter course is C. E. Murphy, a faculty member of the Division of Engineering at Texas College of Arts & Industries at Kingsville. Mr. Murphy is well qualified, having both gas company and teaching experience. He will administer the course as its director.

Dr. Frank H. Dotterweich, head of the engineering division at Texas A&I, said: ". . . The industry has long felt the need for such a course. In my opinion, education in the gas industry is one of its prerequisites for survival. Our technology has gone ahead with rapid strides, but our educational facilities have been sadly lacking."

The Home Study Course, which is not for academic credit, is offered under two plans: (1) On an individual basis wherein the student obtains the text and submits his work to Texas A&I for correction and evaluation; and (2) on a company basis, in which the company secures a number of texts and administers the course as it sees fit.

The registration fee is $60 to the individual student. Course material is available at $30 per set for companies who want to use their own facilities.

Southern Gas Association headquarters, at 1524 Life of America Building, Dallas 2, started accepting enrollment applications on Jan. 1. SGA will be happy to accept applications and answer any further questions about the course.

Southern Union also has new training course

A new training program for construction and maintenance supervisors and foremen employed by Southern Union Gas Co. (Dallas) will be conducted periodically this year at locations throughout its service areas in Texas, New Mexico, Arizona, and Colorado. The program was initiated during the week of Nov. 30, 1959, in Dallas.

Porter W. Martin held the first presentation of the program. Supervisors from the several operating districts and divisions were in attendance.

Presentation of the course to construction and maintenance foremen will be made by Roy Wiegand, staff assistant for C&M. Classes in divisions will be conducted by division personnel.

The course is prepared in textbook form. Work on the training book was begun by Martin over a year ago. He poured his more than 40 years of gas company experience into the volume.

The objective of the training book and program is to better equip Southern Union personnel to perform all phases of the company's distribution operations as required by the strict codes which the company meets or exceeds.

Bridges replaces McQueen at AGA

Mrs. Ellen Bridges, home service director for the Gas Service Co., Pittsburg, Kan., has been selected to head home service activities for the American Gas Association. She took over her new job on Jan. 1.

As the top home economist for AGA, she will have her offices at 420 Lexington Ave., New York. About 50 to 60 per cent of her time will be spent in traveling.

She will contact major gas utilities, magazine editors, food companies, and gas appliance manufacturers in both the United States and Canada. In addition, she will be active in AGA conventions and regional meetings and be responsible for the National Home Service Workshop held annually.

Mrs. Bridges is recognized as one of the top home service demonstrators. She has appeared on many AGA programs including the national workshop in past years.

One of her workshop demonstrations was published in a book on demonstration techniques by Mary Brown Allgood, nationally recognized authority at Pennsylvania State University

Mrs. Bridges has been home service director for Gas Service in Pittsburg since 1944.

Gas appliance center opened in Dallas

Gas Industry Exhibitors Inc. opened a permanent gas appliance center on Jan. 2. in Dallas.

The center is designed to provide manufacturers of gas equipment with a centralized location for year-round display purposes. It is housed in the new Trade Mart building located near downtown Dallas.

One of the corporation's principals, David J. Kerr, stated that the total space leased in the Trade Mart for the center is over 20,000 sq ft. Some 2000 of this are dedicated for permanent industry exhibit. The rest—less office space and service areas—is being used by manufacturers of gas appliances and equipment to exhibit their products.

A full-time manager and hostess are on hand to assist exhibitors and promote attendance.

District office moves

Ohio Fuel Gas Co. is moving its eastern Ohio district headquarters from Zanesville to Cambridge. The move is scheduled for late spring. The change results from the recent combination of the Salem and Zanesville districts into the Cambridge district.

One educational exhibit shows how natural gas moves from wellhead to burner tip. An explanatory tape recording is synchronized with a series of lights depicting the various steps required to move the gas. Gold-plated domestic meter signifies the 827,705 customers being served by the company after 50 years of service. Small Christmas tree wellhead fitting signifies the 13,000 wells producing gas for these customers.

Texans aware of gas at fair

AT the close of the Texas State Fair, more than 4 million people were aware that Lone Star Gas Co. had been an important part of the exposition. An estimated 1.1 million actually saw Lone Star exhibits, while the remainder were informed by newspaper, radio, and TV coverage.

Lone Star's exhibits were in the Gas Exhibits building and the Women's building. Lone Star has leased the gas building since 1936.

Every possible means of promotion was used by the company to call attention to its educational displays. This fair marked the first time that Lone Star has placed extra emphasis on educational type exhibits.

In addition, there were colorful, cleverly designed commercial displays.

Lone Star sent out spot announcements over loudspeakers on the fair grounds. Speakers are strategically situated around the 200-acre layout. Lone Star rented the facilities and obtained rights from the Fair management. The fair itself has used the system since 1936 to promote attractions at the giant exposition.

Japanese-styled gas kitchen in Lone Star's exhibit building.

Manufacturers aims for more fleet safety honors

Manufacturers Light & Heat Co. isn't content with two straight Fleet Safety Awards. The Pittsburgh-based company is in the midst of a concentrated driver training course to achieve an even better record.

Manufacturers operates 1089 vehicles in its area. It had an accident rate of .96 per 100,000 miles in 1958 compared with the national average of 1.51.

Since the driver refresher course was launched in May 1958, 2113 employees have taken the course. One division has gone 714,102 miles without an accident since completing the course.

One of the major tools used is the "Drivotrainer." This electromechanical training device was developed by Aetna Casualty & Surety Co. and is made by Automatic Voting Machine Co., a division of Rockwell Manufacturing Co.

Using an automobile mock-up, the device is complete with steering wheel, instrument panel, brakes, gas pedal and even automatic transmission buttons on some models. The driver sits behind the wheel and takes his test drive along a street pattern projected on a movie screen in front of him.

In Manufacturers' refresher course, Drivotrainer is used to check the experienced driver's reaction to traffic problems and emergency situations. His adherence to given speed limits, his reaction time on the brake, and overall control of the car are recorded electronically in an adjacent control unit.

Calif. PUC wants more experts in Washington

California's PUC is seeking funds for added attorneys and other experts to appear before the FPC in Washington on rate matters.

Need for the new personnel, it was explained, arises from the importation of natural gas from Texas, the Rocky Mountain states, and eventually from Canada.

Chief Commission Counsel William M. Bennett said it is imperative that California be represented at rate increase hearings and producers and pipeliners. He said these boosts are automatically passed on to the consumer by California utilities. "We are fighting the giants of the oil industry," he said.

Commission President E. C. McKeage said that utilities appear at the hearings. But, they do not put up a hard fight because it is so easy for them merely to adjust consumer rates.

The commission asked $85,000 to hire two attorneys, three engineers, a statistician, and other employees.

Peoples Gas honored

Peoples Gas System of Florida has been awarded national recognition for employing physically handicapped veterans. The award is a certificate of appreciation from the American Legion.

Of the company's 418 employees, 21 are physically handicapped. Of this number, 19 are veterans.

production begins

American Meter Co. personnel in the assembly department handle first Reliance Type K regulators produced in the company's newly opened Reliance Regulator Division headquarters at Fullerton, Calif. Elevated conveyor in background carries regulator castings. Automation is used throughout the new 65,000-sq ft Reliance facilities to help the division keep pace with expanding West Coast demand for gas regulation equipment. The new addition more than doubles the plant's size. It houses all production, customer service, warehousing and research operations of the division.

"Total effort" campaign moves clothes dryers

Michigan Consolidated Gas Co.'s "total effort" campaign sold more gas clothes dryers in a seven-week period than were sold in the previous eight months.

The company, along with 470 cooperating dealers, sold 7963 dryers during the campaign. This compares with 7826 sold for the first eight months of the year and 4069 sold during the comparable period in 1958.

Michigan Consolidated salesmen made up less than 5 per cent of the sales force. Yet they accounted for 19 per cent of total sales. Company sales rose 130 per cent over the same period in 1958.

Fred A. Kaiser, vice president and general manager, said that at the end of August, dryer sales in the Detroit district were lagging 26 per cent behind last year. At the end of the campaign, sales were up 14 per cent.

Consumers buys producing field

Consumers Power Co., Jackson, Mich., has bought the majority of the working interests in the Salem gas field in Allegan county. Field includes 5000 acres with 31 producing wells. It will reinforce the company's gas supply in western Michigan. Salem will be connected with Consumers network by a junction with the Overisel-Laingsburg line. Later, a pipeline is planned from Salem to the new Overisel compressor station. Ultimately, both the Overisel field (bought two years ago) and Salem will be converted to gas storage.

IGT reports on research progress

Significant progress in gas technology research highlighted the 1958-59 annual report of the Institute of Gas Technology. Dr. Martin Elliott, IGT director, made his report at IGT's annual board of trustees luncheon held recently in Chicago.

Dr. Elliott reported some research gains in the institute's continuing program to develop the direct production of gas from oil shale. Research on the hydrogasification of eastern shales showed that these shales can produce almost as much gas per unit weight as western shales. This holds true, he said, even though the potential oil yield per ton from typical eastern shales is much less than from western.

The IGT director also said that new concepts have been developed for pinpointing leaks in gas distribution systems by sonic methods.

During the meeting, E. H. Tollefson, president of Consolidated Natural Gas Co., New York, was re-elected chairman of the board of trustees of IGT.

Newly elected trustees are Ed Parkes, president of United Gas Corp., Shreveport; R. F. Brooker, president, Whirlpool Corp., St. Joseph, Mich.; and Karl E. Schmidt, vice president, Michigan Consolidated Gas Co., Detroit.

What is utility's economic contribution?

How much does a utility contribute to the economic well-being of the communities it serves?

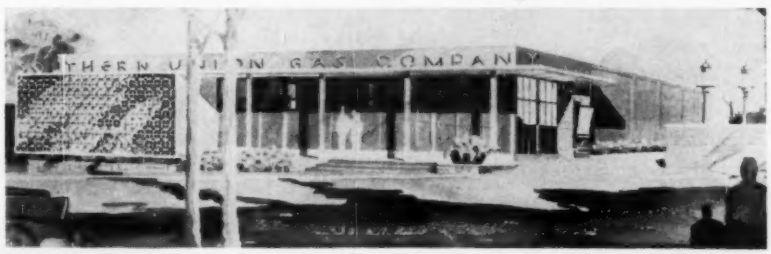
Plenty, said Robert A. Hornby, president of Pacific Lighting Corp., when he spoke to the Los Angeles Society of Security Analysists recently.

- Since World War II, $462 million has been pumped into southern California economy as a result of expansion of the three Pacific Lighting companies serving the area.
- Some $53.3 million goes out in annual payrolls to gas company employees;
- $4 million in current yearly dividends are paid to southern California shareholders;
- $22.7 million in annual ad valorem taxes and franchise payments are paid to 368 Southland communities in which the utilities operate.

"That, from the Pacific Lighting System, is a healthy measure of yeast for the rise of southern California economy," Hornby declared.

Most of this money, he said, comes from the investing public outside the area. "It has been many years since California could finance the growth of the Pacific Lighting system—or for that matter the growth of any other large utility system in the state."

New Southern Union headquarters



Southern Union Gas Co. will build this ultra-modern office building in Farmington, N. M. The air-conditioned structure will contain about 9000 sq ft. When completed, it will serve as headquarters for local and Santa Fe district operations.

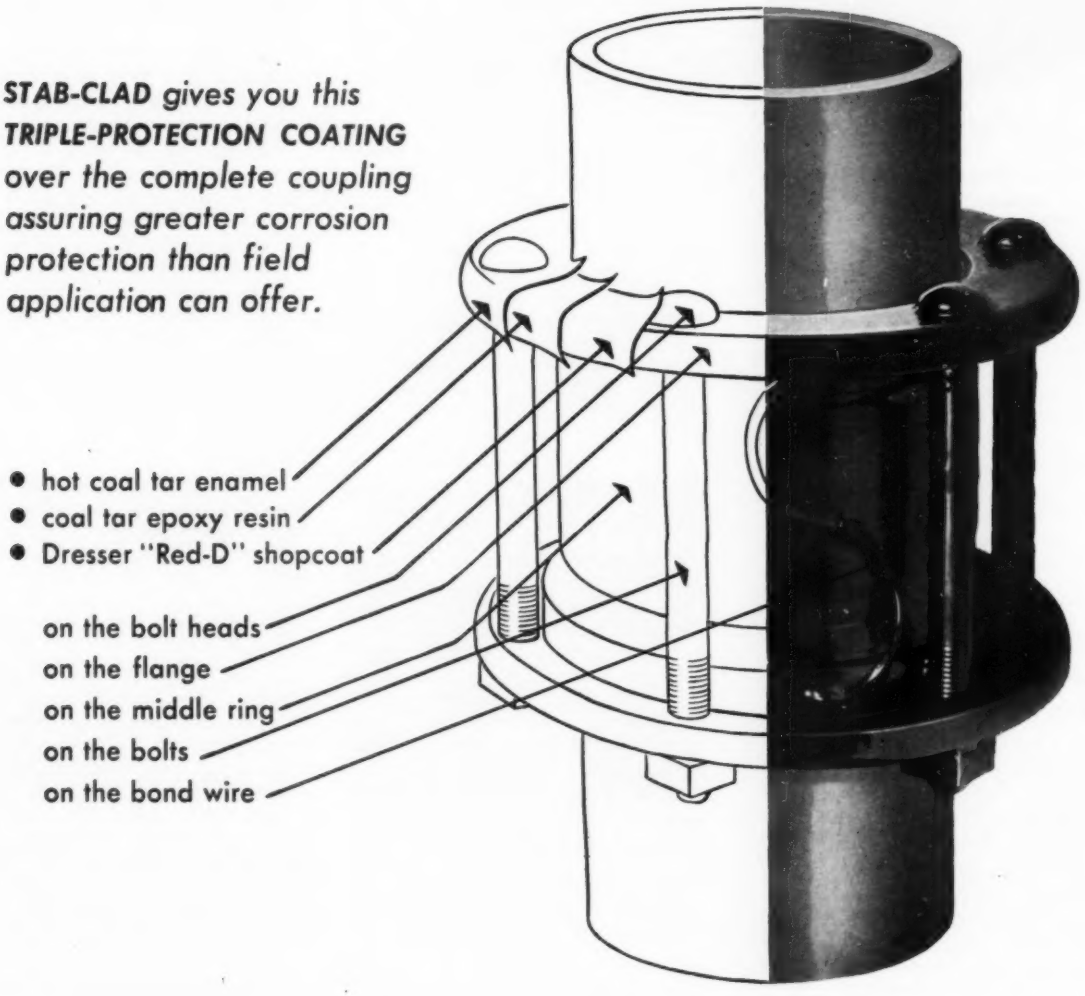
Pre-assembled and Pre-coated

NEW "stab-clad" couplings

Trade Mark Style 123

Revolutionize the installation of coated pipe!

***STAB-CLAD** gives you this **TRIPLE-PROTECTION COATING** over the complete coupling assuring greater corrosion protection than field application can offer.*


• hot coal tar enamel
• coal tar epoxy resin
• Dresser "Red-D" shopcoat
on the bolt heads
on the flange
on the middle ring
on the bolts
on the bond wire

COATED PIPES can be strung more quickly and safely than ever before with these new Dresser® STAB-CLAD Couplings.

Save the time of on-the-job coupling assembly – for STAB-CLAD is a one-piece unit! When you stab in the pipe ends and tighten the bolts you *immediately* have a finished, permanent connection that is already coated and protected.

Check these facts for yourself by using Dresser STAB-CLAD'S on your next coated-pipe installation. You'll agree with those who have found that STAB-CLAD'S are a "time and money saver" in performance.

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1958 total net income reached $692 million

Gas utility and pipeline industry net income reached $692 million in 1958, an all-time high. The figure was contained in AGA's final summary of 1958 statistical studies.

The industry's net income represented a 6.8 per cent gain over the $648 million recorded in 1957. Income of pipelines alone totaled $252 million compared with $246 million for 1957.

Total operating income from all sources advanced to $7106 million, a 10.8 per cent hike over 1957. Utility operating income of $922 million was a 9.5 per cent gain, while net plant increased in value from $13,295 million in 1957 to $14,255 million in 1958.

Relationship between utility operating income and net utility plant (the largest factor used in determining the rate base) indicates an approximate return of 6.5 per cent, up from 6.3 a year earlier.

Mobile display

Fisher Governor's new mobile display truck provides educational service to gas industry customers. The unit is equipped with sectional and working models of Fisher equipment, a movie entitled "Muscles of Control," and a supply of literature. Equipment may be removed for display or shown in the truck when the powered side panels are raised.

An openhouse marked the official opening of Charles Machine Works' new office and factory building near Perry, Okla. Some 1000 attended the opening. The new plant consists of 25,000 sq ft of factory space and 5000 sq ft of office space and showrooms. The plant features an air strip and a company-built lake well stocked with game fish for the enjoyment of employees.

Canadian cities launch home incinerator plan

Saskatchewan towns are launching municipal programs calling for installation of home gas incinerators. Latest to join the move is Moosomin. Earlier programs were launched in Saskatoon and Yorkton.

As worked out and approved by the Moosomin council, the plan presents a realistic solution to the problem of rising costs of garbage collection and disposal.

Moosomin has arranged to obtain a supply of home gas incinerators. These will be available to householders at an installed price of $114 each. Of this cost, the town will provide for $5 per year for five years for each unit, through a tax allocation plan. This leaves an $89 balance to be paid by the householder.

Abstracts offered

A new service, "Instrumentation Abstracts," is being made available by Charles Doak Lowry Jr. and Seaton T. Preston Jr.

The abstracts will cover all significant articles on instrumentation which may be of interest to technical people in the gas, chemical, petrochemical, petroleum, food, steel and glass industries. American and foreign journal articles, papers presented at technical meetings, patents and books will be covered.

Additional information on the service is available from Instrumentation Abstracts, 80 E. Jackson Blvd., Chicago 4.

There are more than 6000 types and sizes of Dresser® service fittings!

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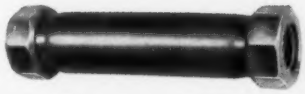
extra rugged...

easily installed...

permanently gas-tight.

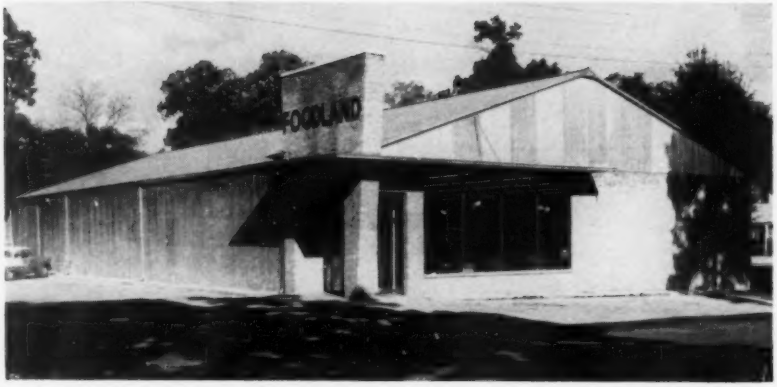


Dresser is the only manufacturer supplying a pipe coupling or fitting for every need in the gas industry.

DRESSER MANUFACTURING DIVISION

Bradford, Pennsylvania

More unique gas uses for grocery store



All-gas supermarket in Prescott, Ark.

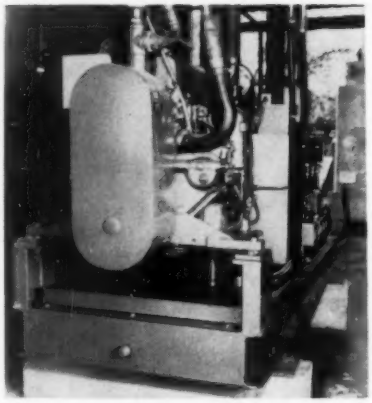
ONE of the nation's few, if not the only, all-gas grocery market is Ward's Foodland in Prescott, Ark.

The market first attracted attention because of its gas-operated combination refrigeration and air conditioning system, believed to be the first of its kind anywhere.

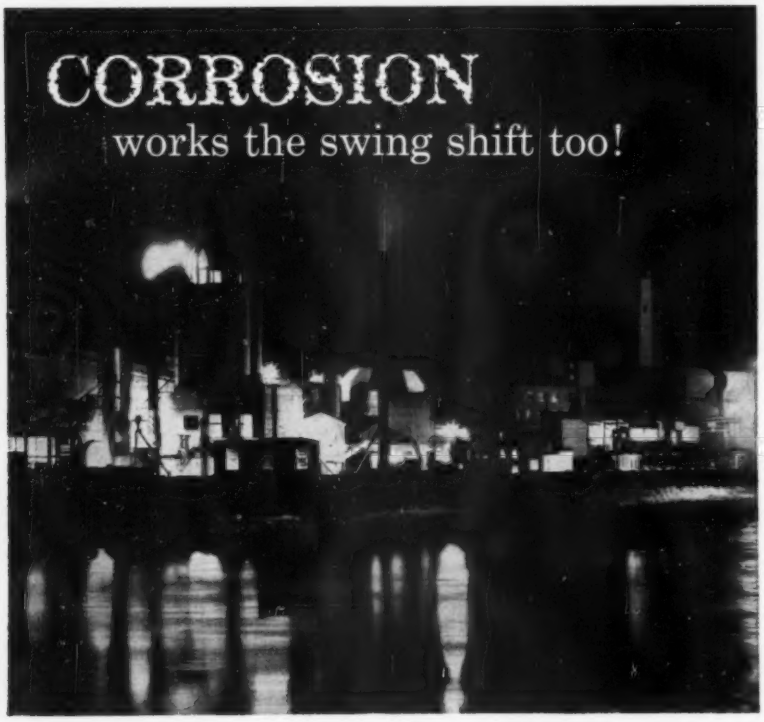
Then recently it went even further with gas when a natural gas-driven generator was put in to furnish all electricity needs.

All refrigeration equipment, except the sub-zero frozen food and ice cream cases, is cooled by a gas engine-driven compressor. Equipment served includes a large walk-in meat cooler and a small produce walk-in; a 36-ft self-service meat case; a 24-ft vegetable case; and a 12 ft, triple-deck dairy case—a total of about 9 tons of product refrigeration. The same compressor provides 13 tons of comfort cooling for the 5000-sq ft customer area.

Arkansas Louisiana Gas Co. designed the unusual refrigeration-air-conditioning system.



Foodland's refrigeration and comfort cooling come from this Ready-Power gas engine-driven compressor located in an equipment shed behind the market.



Thousands of miles of underground pipe feed natural gas to factories . . . other pipelines distribute oil and other petroleum products. And every foot . . . every inch . . . could corrode and leak anytime, day or night.

Electro Rust-Proofing can assist in the big job of corrosion control. Assist with surveys, design recommendations and actual installation of corrosion control systems.

Even if you have your own corrosion engineering group, ERP can swing extra manpower and engineering experience onto rush jobs—supplement your own team on the special problems.

For full information on ERP Pipeline Corrosion Control, Write Dept. E-52.41.

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A SUBSIDIARY OF WALLACE & TIERNAN INC.
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Bank features gas

Unique gas built-in kitchen display in lobby of Los Angeles bank is previewed by (l to r): E. L. Shaw, vice president of Security-First National bank; H. M. O'Haver, Southern California Gas Co. division sales manager; teller Barbara Gustafson; and bank vice president D. Z. Albright. Recent changes in FHA property improvement program allow built-in appliances to be included under FHA loan terms.

Distributor named

W. W. Williams Co., Columbus, Ohio, is crane - excavator - rotary drill distributor for Bucyrus-Erie Co., South Milwaukee, Wis. In addition to Ohio, the Williams firm covers several counties in Kentucky and Indiana.

Safety Record

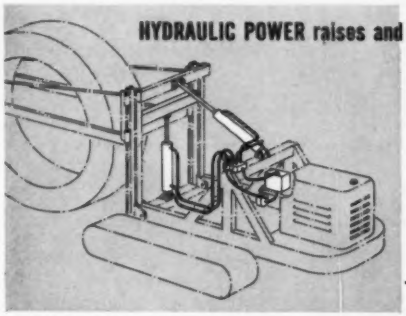
Some 563 employees of Lone Star Gas Co.'s West Texas distribution region have completed one million manhours without a lost-time injury. The region, headquartered in Abilene, set the record in a 10-month period from Dec. 6, 1958, to Oct. 16, 1959.

This marks the first time in Lone Star history that a major field distribution unit has attained such a record. It also marks the seventh millionth-hour record by individual units in the company's 50 years. Three of the records are held by districts within the West Texas region. The region comprises 108 towns in 15 districts.

Operating on a limited budget?

Then check what this economy-size Parsons® 130 can do for you...

Here's a good, small, wheel-type ditcher in the popular low-price range that's big enough for main line trenching . . . yet, economical on extensions, service lines and other utility jobs. You get 12 inches to 18 lineal feet of trench per minute . . . 12 to 24 inches wide . . . at depths to 5¾ feet. Low in price, big in capacity, this Parsons 130 is built to the same heavy-duty high-quality standards of larger Parsons wheel Trenchliners. It has hydraulic wheel-hoist on power-tilt mast. Shiftable, reversible belt conveyor gives controlled discharge (hydraulic conveyor drive optional). To handle a wide range of soil conditions, heavy-duty digging wheel is equipped with cast-steel buckets with self-sharpening, reversible "Tap-In" teeth, quick-change gumbo buckets, retractable bucket-cleaner. Low-cost 130 also has 12-in. integral pad and rail-type crawlers. Tractor-type crawlers optional with 12-in. flat or 16-in. grouser shoes. See Parsons distributor — soon! 4 larger wheel-type, 5 ladder-type Trenchliners also available for any size trench from 6 inches to 6 feet wide, up to 19 feet deep.



HYDRAULIC POWER raises and lowers the wheel... and tilts the mast

Specified grades are easy to maintain with Parsons 130. Hydraulic ram on vertical mast raises and lowers the digging wheel — gives fractional-inch depth adjustment, maintains close grade tolerance. A separate hydraulic ram tilts mast, balances weight of wheel forward for traveling or trailer-loading. Overall width is only 8 feet (with conveyor intact) — no dismantling for transport.

Mail to: PARSONS Company, Newton, Iowa

Send us: ☐ latest literature ☐ price information on 130 Trenchliner®

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COMPANY ..... DIV. .....

STREET .....

CITY ..... STATE .....

P922 GAS

PARSONS TRENCHLINERS

(A Division of Koehring Company)

NEW Lancaster VALVE COVER

eliminates practically all troubles from normal sticking and lifting valves . . .

* Gum-resistant ring specially compounded of friction-free inert carbon-graphite

New Lancaster Valve Cover has the most level and truly concentric seat surface ever achieved. Special compound of carbon-graphite is strong, shock resistant and silent . . . ends valve squeaks and is far less apt to break or chip in transit, repair or installation.

Large ½-inch stud is made of long wearing nickle-silver. It's rounded and swaged into the rugged brass shell . . . allows continual, positive contact with any driving dog position.

* Large-Profile Stud offers greater contact area

New, Improved Lancaster Carrier Wire Assembly

keeps pans moving in straight line . . .

Side carrier bracket height adjustment assures most accurate positioning . . . oval slots in new center bracket allow straight through diaphragm travel. Center bracket available separately adapts to any carrier wire. Porous bronze graphite bearings throughout.

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UGI buys third LPG firm

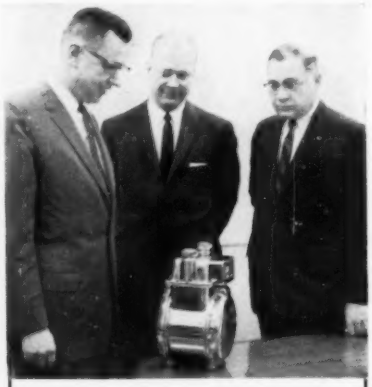
Through its subsidiary, Ugite Gas Inc., United Gas Improvement Co. is planning to buy A. C. Horner Inc., Harrisburg, Pa. Horner serves LPG in the eastern and central regions of Pennsylvania from plants in Harrisburg and York. This is the third LPG company operating in the region to be purchased recently in UGI.

West Germany expansion

Rockwell Manufacturing Co. will build a 150,000-sq ft addition to its plant at Pinneberg, West Germany. Liquid meters, valves, and woodworking power tools will be produced there for both European and world markets.

Industrial gas users meet

Some 200 Connecticut industrialists attended the Connecticut Industrial Gas Workshop sponsored by Connecticut Light & Power Co. The workshop is a series of seminar-type group gatherings. Industrial gas users listened to and talked with experts on subjects of special interest to them in their plant operations.



Milestone

Consumers Power Co. executives (from left) John B. Simpson, vice president, operations; Alphonse Aymond, executive vice president; and President Dan E. Karn, admire chrome-plated symbol of important company milestone: the 500,000th gas meter installed on the company's system in Outstate Michigan. Karn said new gas connections during 1958 averaged 75 per working day.

Centennial

Twenty-three gas lights, exact reproductions of the outdoor lanterns that lighted early Philadelphia streets, were installed at Point Park as part of Pittsburgh's 1959 Bi-Centennial celebration. Maintenance man from Gas Consumers Service services the lamps, a weekly operation. Veritas of London makes the gas lamps for Equitable Gas Co. of Pittsburgh.

American expands

American Meter Co. has purchased the Granberg Corp. of Oakland, Calif. Granberg makes tank truck, bulk plant, and petroleum pipeline meters and pumps.

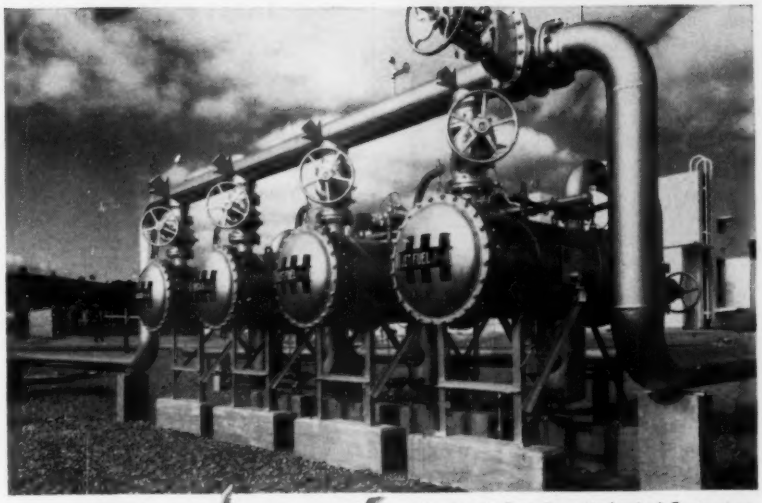
American now enters the petroleum marketing field and strengthens its position in the measurement industry.

Albert H. Granberg, president and founder of the company, will be retained as a consultant, Russell W. Wetjen will supervise the Granberg operations as vice president and general manager. He also is general manager of the Buffalo Meter Co.

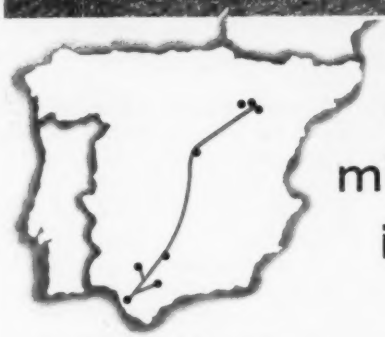
Water heaters studied

AGA has published a report on research into corrosion protection of gas water heaters by magnesium anodes. The study entitled "Cathodic Protection of Domestic Gas-Fired Hot Water Storage Tanks," was done by Case Institute of Technology.

Copies of the report are available for $1 from AGA headquarters order department, 420 Lexington Ave., New York 17.



Markowitz Bros. Inc., Mechanical Contractors
Miami, Florida



on the military pipeline in SPAIN...

WELDOLETS were used for all branch connections on pumping station piping

Reinforced branch connections constructed with Weldolet Welding Fittings provide assurance of quality workmanship at the critical branch connection.

Savings in purchase price and construction on this project alone were high in the six figures. Piping designers and contractors who are interested in similar savings on their jobs are invited to write us for the Bonney Spanish Pipeline Brochure.

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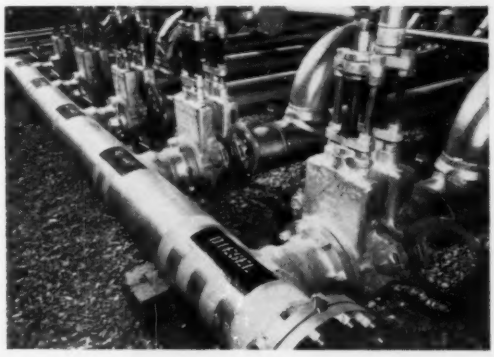

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Flat Head
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With or Less Check Pin
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Also Available in
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and
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GAS SERVICE PRODUCTS
HAYS MFG. CO.
ERIE, PA.

regulatory • *Cont'd.*

from page 12

place. (The uniform type of contract, standard criteria, etc., would greatly facilitate and expedite the processing.) In such cases where the proposed initial prices exceed the 'initial ceiling prices' the certificates would be conditioned at the 'initial ceiling prices.' Then, if the certificate be accepted and service commenced, an increase to the proposed price could be filed, suspended for a very short period and at the end of the suspension period the usual motion to make the price effective, accompanied by a bond or corporate undertaking, could be filed and the case could be tried under Section 4 while service continues.

"In those cases where rates at prices below the 'ceiling' have been suspended by the commission, immediate steps could be taken to terminate the proceedings or expedite settlements based on the 'ceiling.' In those cases where rates or prices above the 'ceiling' have been suspended, 'ceiling prices' arrived at in the manner already discussed could be a basis for talking settlement." ■

Washington • *Cont'd.*

from page 17

to rise to the ceiling. Prices that topped the ceiling would be suspended, or at least that part exceeding the ceiling, and subject to close study by the FPC.

Cost, and other factors, would be considered in setting these ceilings. Details of how to arrive at these ceilings have caused considerable discussion within FPC, however.

Reaction to this proposal has been cool in many areas of the gas industry. Washington gas industry spokesmen, reflecting reaction from their firms, indicate the position of producers and pipelines ranges from illegal, to unfair, to "we'll wait and see what comes from it in the way of ceilings."

Many spokesmen here say they do not believe such an approach by FPC is anywhere near a substitute for a reasonable correction of the present control problem through congressional legislation. They oppose it because they believe it would tend to "take the heat off" of supporters of the gas bill, and thus require the industry to accept a not-too-good substitute.

SHORTAGES of some steel products, including pipe fabrication material, are still predicted for the spring months.

Although steel production snapped back faster than expected after the Taft-Hartley injunction forced mills to reopen, the problem of making up for the huge tonnages lost during the strike rests on rate of flow of the metal through the supply lines.

Consumption during the cooling off period—which ends this month—ran just about even with production, so there was little if any inventory buildup by metal fabricators or users. In addition, much of the first steel ingot produced was turned into products for the government's defense program under a priority program, and other huge lots were shipped to the steel industry's biggest customers and those hurt most by the strike, including the auto makers.

There is still a possibility that even tighter shortages of steel will return this spring. The mills were low on ore supplies, even though imports from other countries were stepped up to offset the shortages of Great Lakes ore.

Production of most sizes of pipe could come back with a bang when the steel supply picture brightens. Pipe is produced from sheet (in coil form, for the most part), and sheet is one of the biggest production products of the mills. When the break comes and primary needs are filled, the pipe situation could be eased quickly.

The government has invoked old Korean War priorities to require steel producers to give preference to orders placed by the Defense Department or defense contractors certified by the Pentagon. Defense uses by volume take only about 3 per cent of total steel capacity—but it comes from specialty and stainless lines, as well as from sheet production.

The government has been under pressure to use its priority rights to take even more steel than it will

actually use during the present work resumption and stockpile it against the possibility of further shortages this spring either from a resumption of the strike or from a cut-back in production as a result of shortages of ore and scrap.

Whether the actual price of steel is raised as a result of the final settlement of the strike or not, the costs of buying steel are certain to go up, industry experts warn. This is because many buyers of steel will have to use secondary sources —warehouses, supplies converted from other products—for which a premium is paid.

Therefore, all three segments of the gas industry face possible shortages of supplies of varying duration, and the distinct possibility of higher costs for construction, whether it is for buildings, rigs, or pipelines.

MUNICIPAL gas systems operated well in the black in 1958, new government figures show.

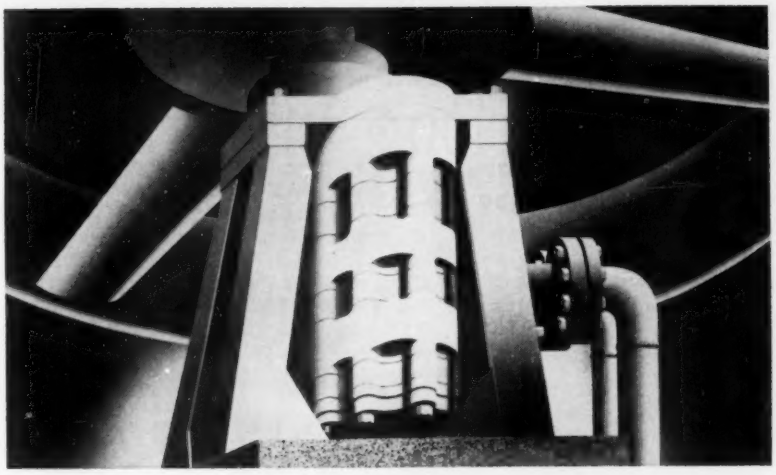
According to the U. S. Census Bureau, municipal gas systems in 1958 registered $173 million in revenue, and spent only $150 million. Expenses totaled $128 million for current operations, $16 million for capital outlay, and $6 million for interest on debt. Total city gas utility debt at the end of the year amounted to $153 million.

City-owned electric systems spent $1.26 billion during the year, while taking in only $1.1 billion. But the bookkeeping loss for these systems was accounted for by capital expenditures amounting to $525 million. These systems also spent $658 million for current operations and $77 million on interest on debt.

corrosion • *Continued from page* 19

$$\text{Eff} = \frac{I \times E}{P} \times 100.$$

This value should be recorded at each monthly inspection, and should be plotted as a function of time. Any unit will eventually show a decline of efficiency due to stack aging; as a general rule, when this has dropped as much as 25 per cent below the original value (at the same load) the stacks should be replaced. ■



New design features increase flexibility of Berry Hydraulic Fan Drives

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- New bearing configuration . . . incorporated to give virtually unlimited operating life on temperature controlled systems.
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Berry Hydraulic Fan Drive systems are now in use by more companies than any other make . . . installed in attended and unattended main line stations, booster stations, field compressor stations, as well as in gasoline plants and refineries. Mail coupon today for more information on Berry Fan Drives.

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GAS • ASSOCIATIONS

GAMA service award goes to Harry Maxon

Harry R. Maxon, pioneer in bringing natural gas to industrial markets, has been honored for 43 years of leadership in the gas industry.

Maxon, retired chairman and founder of the Maxon Premix Burner Co., Muncie, Ind., received the distinguished service award of the industrial gas equipment division of GAMA. Presentation was made at the annual meeting of the AGA's industrial division held recently in Chicago.

From 1910 until his retirement in 1954, the citation said, Maxon was responsible for many new methods of firing gas industrial furnaces and large boilers. He was also cited for the development of high temperature gas applications that made possible more efficient forge furnaces, refractory kilns, malleable iron furnaces and other industrial processing equipment.

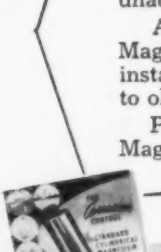
Harry R. Maxon, Jr. (center) accepts GAMA's distinguished service award on behalf of his father, retired chairman and founder of the Maxon Premix Burner Co. Making presentation are E. J. Funk, Jr. (left), chairman of the awards committee, and Robert C. LeMay, chairman of the industrial gas equipment division of GAMA.

STANDARD MAGNESIUM ANODES CUT MAINTENANCE COSTS, ELIMINATE HAZARDS, REDUCE UNACCOUNTED-FOR GAS!

Maintenance costs are skyrocketing. Yet a simple, effective method of reducing or completely eliminating these costs is with Standard Magnesium Anodes. And they eliminate hazards and reduce unaccounted-for gas.

A cathodic protection system using Standard Magnesium Anodes is inexpensive and easy to install. It will add years of maintenance-free life to old as well as new lines by stopping corrosion.

Protect that next installation by using Standard Magnesium Anodes.



FREE: Booklet describing how you can prevent corrosion.

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Corrosion control course set for February

The 11th annual corrosion short course for pipeliners is slated for Feb. 24-26 in Tulsa's Mayo Hotel. The three-day session is sponsored by the Tulsa section of the National Association of Corrosion engineers.

Covering practical control of pipeline corrosion, the course is planned specifically for foremen, superintendents, field and junior engineers, technicians, and inspectors. Experienced corrosion engineers give non-technical presentations on the causes of corrosion, measurements and instrumentation, pipe coatings, galvanic anodes, impressed currents, and miscellaneous corrosion control devices.

Additional information is available from Ray Amstutz, publicity chairman, Tulsa Section, NACE, Box 4597, Tulsa.

National honor goes to AGA

American Gas Association has been named grand award winner in competition with other large na-

tional associations. The outstanding activities award for public service is given annually by the American Society of Association Executives.

AGA was chosen for the top award because of its exhaustive, and successful, public relations program started five years ago. The project had as its major goals to stimulate new public appreciation of the gas industry, help solve the intricate problems hampering its growth, and to develop concrete programs to assure the industry keeping pace with changing times.

Accident Prevention

National Safety Council has published the fourth edition of its "Accident Prevention Manual for Industrial Operations." More than 500 illustrations are included in the 1542 pages of up-to-the-minute data on every aspect of industrial safety. Further information is available from the council, 425 N. Michigan Ave., Chicago 11.

Serving as chairmen of the personnel seminar held in Philadelphia recently were Norman D. Bradley (left), system employee relations director, Consolidated Natural Gas Co., and Hammitt L. Robbins, director of administration for Philadelphia Gas Works. The seminar, sponsored by the Pennsylvania Gas Association in conjunction with the New Jersey Gas Association and the AGA, attracted 150 gas industry people from nine states. Program centered around three main areas: employee selection, improvement of job performance, and employee attitudes.

We're Still Looking for a Pipe Fitter Who Doesn't Prefer RIDGID
RIDGID HEAVY DUTY 14
"Of Course I said RIDGID ... It's the only pipe wrench for my money. I've got work to do!"
At your Supply House
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THREADED PIPE... It's Tight... It's Best... Costs Less!

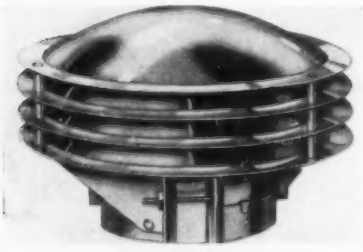
GAS DIGEST

New Products and Trade Literature

For more data on any of these items use the Readers' Service Card on pages 81, 82

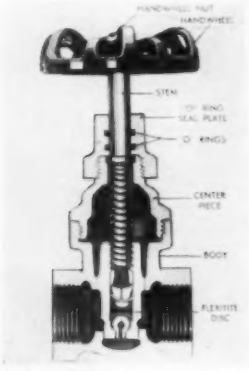
1. Pipe tracer

Scinta-Ray is a new technique for tracing non-metallic pipe and pinpointing pipe stoppages by using a radioactive source. The source is attached to a wire, cable, etc., and pushed down the line. The operator—on the surface—follows the exact path of the source with Scinta-Ray readings.
Goldak Co. Inc.



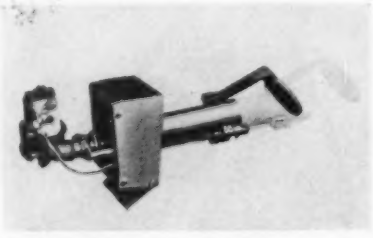
2. Chimney cap

A new adjustable chimney cap in four models fits pipe diameters from 3 through 8½ in. The all-new design works on double-wall metal vents, standard chimneys, and any roof-terminated vent pipe. Versacap protects vent system from entry of snow, rain, debris, and birds.
Leslie Welding Co.



3. Gate valve

Musco "O" ring brass gate valves use two "O" rings in place of fiber asbestos packing. They are placed in an "O" ring seal plate. The top ring serves as a dirt seal, the bottom as a fluid seal. The valves are for general service on lines where straight-through flow is desired.
Modern Utility Supply Co.

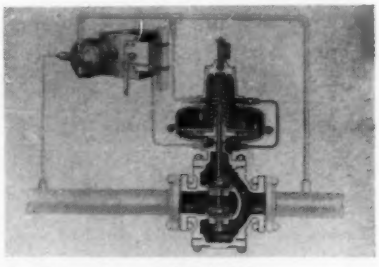


4. Conversion burner

Barber's new gas conversion burner features "Tele-Tube," an adjustable venturi. It telescopes from 6½ to 13½ in. to fit most furnace and boiler entrances. It is designed specifically for change-overs from oil to gas. The entire unit weighs only 13 lb, yet delivers 50,000 to 225,000 Btu, enough to heat a 12-room house.
Barber Manufacturing Co.

5. Gas light

Specially designed hurricane-style chimney is featured in the Riviera, the latest Gaslite by Arkla. The Riviera's styling shows a decidedly French influence. The light is accented by an eagle crest. The new chimney has an ornamental brass gallery.
Arkla Air Conditioning.



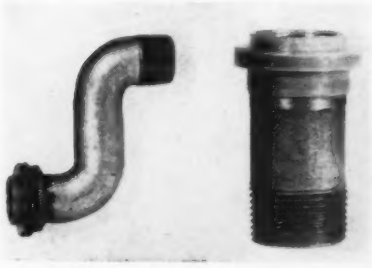
6. Remote control drive

Most Fisher pilot-operated gas regulators can now be set remotely by using a Series 606 Kixcel remote control drive unit. This electric power source turns the pilot's adjusting screw either for an increase or decrease in the reduced pressure of a system. It is controlled from a remote station by means of a conventional telemetering equipment or by a d.c. control

signal supplied from a polarized signal transmitter.
Fisher Governor Co.

7. Electronic computer

Royal McBee has a new fully transistorized, general-purpose electronic computing system. The RPC - 4000 offers in one complete system flexibility for handling both business and engineering problems. The system features unusually large storage capacity for data and programs, plus high operating speeds, and complete flexibility of input-output. It can operate on 9-digit numbers at rates up to 240,000 operations per minute.
Royal McBee Corp.



8. Meter swivels

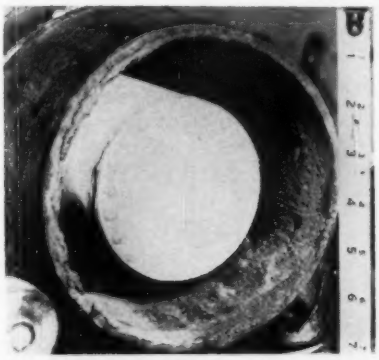
A complete line of nylon-molded, insulated meter swivels is available for use on all makes of gas meters. They are furnished straight, offset, male and female reducing, either galvanized or black malleable iron. Nylon is molded and bonded directly to the metal.
Central Plastics

9. Radio circuit

A new five-stage transistorized automobile radio circuit design plays instantly when turned on and consumes less current than a car's parking lights. The circuit would use newly developed RCA "drift" transistors. Line-up for this high-reliability circuit includes radio frequency amplifier, converter, intermediate frequency amplifier, driver, and a single-ended or push-pull audio output stage.
Radio Corp. of America

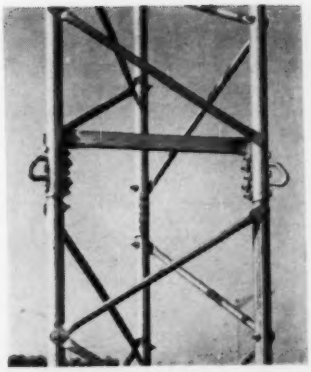
10. Temperature control

Robertshaw has designed a new temperature control system for gas ovens that enables foods to be held at warming temperatures without continuing cooking. To the homemaker, the new control system means she will be able to cook a roast to precisely the desired doneness, reset the oven temperature dial, and keep the meat at the exact serving temperature without its continuing to cook and going from medium rare to well done. Entire meals may be prepared well in advance of the dinner hour, and kept at the perfect serving temperature until serving time.
Robertshaw-Fulton



11. Miniature X-ray

Radiatron's miniature (3½-in. diameter, 13½-in. length) X-ray tube can X-ray gas bottles which must be reached through small enclosures, longitudinal seams and ends of small diameter pipe, and the insides of small valves. Probe-X weighs 5 lb, is rated at 100 vilovolts, constant potential, at 5 milliamps. It operates on any 10-amp, 115-v a.c. circuit with no special wiring. The Probe-X can be extended up to 100 ft from its small, portable cooling and generating unit.
Radiatron Mfg. Corp.



12. Communications towers

Motorola has a complete line of high strength, tubular alloy steel communications towers. Structures range from 10 to 500 ft in height. They are of three-sided sectional design. Sections are 10 or 20 ft long and in four weights.
Motorola Communications

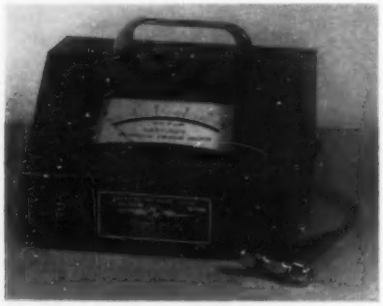
13. Cooking top, barbecue

Latest addition to O'Keefe & Merritt's line is this new ceramic, gas-fired built-in cooking top and barbecue. Featured are gas-fired ceramic coals for fast, clean heat, and a chrome grill that is easy to clean. The unit includes a full size charcoal type barbecue grill in addition to four giant top burners, a polished griddle, and precision temperature control for one of the top burners.
O'Keefe & Merritt Co.

14. "Job-planned" bodies

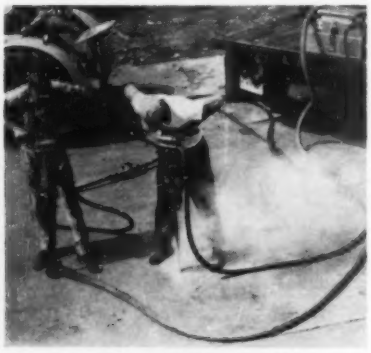
A new series of streamlined "job-planned" utility truck bodies has been designed specially for the gas industry. New units have turned radius corners at the top of each side compartment. Not only

does this enhance the appearance, it gives extra durability to the rub rail which protects sides from damage. Compartment capacity varies from 35 cu ft in half-ton models to 68 cu ft in 1-ton bodies.
Reading Body Works



15. Pressure gauge

Hastings-Raydist has a new series of electrical instruments for accurate determination of differential pressure of air and other gases. Their sensing device is a noble metal thermopile installed in a flow tube. These flow tubes can be installed directly in a line for use as draft gauges or for controlling differential pressure in industrial and commercial heating systems. They also can be installed so as to measure pressure differential across an orifice in a gas or air line, thus becoming the equivalent of a remote electrical flowmeter.
Hastings-Raydist Inc.

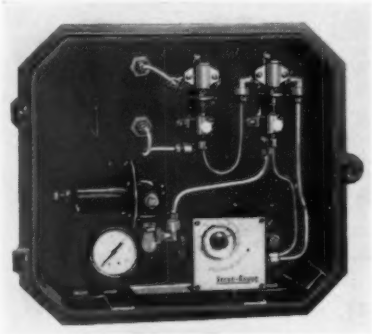


16. Dustless drilling system

Le Roi has developed a dust-collecting system for use with hand-held sinker drills. It can be used with any brand of rock drills. Dust and cuttings are trapped by a collar that fits around the drill steel and are "inhaled" through a connecting hose to a Le Roi dust-collecting tank. Benefits of the system include dust elimination as a health measure, increased comfort and efficiency for the operator, and building of good relations in residential or pedestrian areas.
Le Roi Division

17. Repairing pipes

Adams pipe clamps offer mechanical features which provide even distribution of pressure during tightening. This insures smooth functioning of the clamp without the danger of crushing weak pipe. Adams No. 220 pipe clamps are available out of stock for pipe diameters from ½ to 8 in., in lengths from 3 to 12 in. They also are available, on special order, for diameters up to 24 in. and lengths up to 21 in.
Adams Pipe Repair Products



18. Pneumatic timer

Associated Control Equipment has a new pneumatically actuated timer which has neither moving parts nor troublesome linkages. Applications of the Servo-Gauge oscillator include speed control of diaphragm pumps, on-off control of cylinder or diaphragm operated valves, timing actuation of power cylinders. In operation, the timer sends out—on a predetermined time cycle—a repetitive signal impulse of a preset magnitude.
Associated Control Equipment

19. Furnace thermostat

Mercury-Round thermostat is now standard equipment on all American-Standard belt-drive, warm air furnaces. Thermostat features completely new decorator design with burnished champagne bronze plastic case to blend with any type of room decoration. Calibration—in easy-to-read 5-deg. increments — covers setting range from 50 to 90 deg.
American-Standard

20. Hydraulic bullgrader

Tilt feature of Harvester's International T-340 hydraulic bullgrader is tailor-made for ditching operations. Both ends of the blade can be raised or lowered up to 15 in. in any angle position. With its high lift capacity, the bullgrader is ideal for work on slopes, banks, and shoulders, and provides sufficient leverage for removing trees and stumps.
International Harvester

21. Miniature annunciator

Panellit's solid state, miniature, low-drain annunciator provides information and control of industrial process systems. The Panastat has no moving parts. All operational functions are performed by highly derated solid state elements. Low energy control circuits and negligible inductance provide intrinsic

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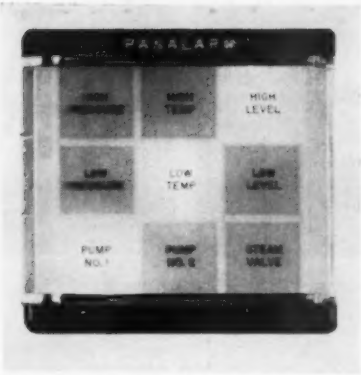
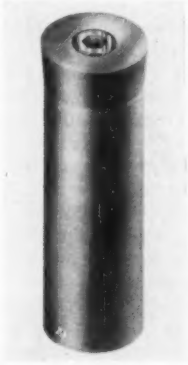


safety. Ignition in hazardous atmospheres is impossible, according to the company, because no arc can be sustained.
Panellit Inc.



22. Pavement inserts

Central plastics has a permanent pavement insert made from high-density polyethylene for gas surveys. It comes in ¾- and 1¾-in. diameters by 6 in. long, enough to go through most street slabs. After insert is in place, pipe plugs can be removed to accommodate leak detection probe for future surveys.
Central Plastics

TRADE LITERATURE

23. Control system

Honeywell's new ElectriK Tel-O-Set system is an integrated system for the electric process control. It features two-wire d.c. transmission. The complete line of transmitters, transducers, receivers, controllers, and final control elements that make up the system are covered in specification FS 301-6.
Minneapolis-Honeywell

24. Industrial controls

General Control's new industrial controls catalog combines information from several other catalogs. Among products covered are automatic temperature, pressure, level and flow controls, as well as counters, switches and automation controls.
General Controls Co.

25. Industrial valves

A new "Buyers' Guide" to industrial valves has been published by Ohio Injector. In addition to cross-indexing the complete OIC line, the 24-page guide contains a list of frequently used abbreviations, a valve trim chart, a list of valves conforming to federal specifications, and complete figure number descriptions.
Ohio Injector Co.

26. Test instruments

Honeywell instruments for scientific measurements, recording, and testing are covered in a new 48-page catalog (G-10). A brief description, typical illustration, salient specifications, and reference for additional information are given for each family of instruments.
Minneapolis-Honeywell

27. Vacuum forming

The economic advantages and the usefulness of vacuum forming as a technique for producing plastic products are discussed in a new 20-page booklet from Eastman Chemical's plastics division. "Vacuum Forming Shapes New Markets; New Opportunities" is the third in the series of "Tenite Plastics Views" issued by the company.
Eastman Chemical Products

28. Ferrous metallurgy

"Basic Guide to Ferrous Metallurgy," available previously as a wall chart, has been produced by Tempil in an 8½- x 11-in. size for engineers' data books. Shown are principal characteristics of steels, important working zones including preheating for welding, stress relieving, normalizing, etc. Twenty-four common metallurgical terms are defined and explained.
Tempil Corp.

29. Wrenches

A simplified method for figuring correct wrench size for any bolt or nut diameter is included in Lowell's new catalog. In addition, Lowell shows its complete line of reversible ratchet wrenches. Full specifications and details are given for Warnock strap wrenches and Swaco wrenches.
Lowell Wrench Co.

30. Valve line

The entire Magnatrol line of electrically controlled magnetic solenoid valves is covered in a new 20-page catalog. Cross-sectional diagrams as well as photos are included to completely explain valve function and operation.
Magnatrol Valve Co.

31. Nondestructive testing

Magnaflux nondestructive test systems are described in a four-page booklet. Tests for magnetic metals and nonmagnetic materials are discussed, along with the company's Sonizon, Stresscoat, and Spotcheck tests.
Magnaflux Corp.

32. Preventive maintenance

A series of original cartoons from J. I. Case points up the importance of preventive tractor maintenance. Printed in four colors on heavy paper, the eye-catching 11- x 13-in. posters contain no advertising and are suitable for tacking on field shacks, shop walls, and bulletin boards.
J. I. Case Co.

33. Thermal systems

A new 4-page sheet describes all well and dry bulb thermal system components used with Brown filled-system thermometer-psychrometers. Also included are water supply accessories for wet bulbs—wick and tank, or porous tube—and suction fans which assure ample flow of air across the wet bulb surface.
Minneapolis-Honeywell

34. Compiling routine

Royal McBee's Act I, a new compiling routine and translator for the LGP-30 electronic computer, is described in Manual S-520. With its aid, any problem can be submitted to the computer in simple algebraic form.
Royal McBee Corp.

35. Washer-dryer

A gas combination washer and dryer has been added to the Norge appliance line. Among features described in Bulletin U-52-59 are the unit's lint screen that cleans itself and the self-cleaner that cleans the cylinder automatically after each wash. The master washing control gives a selection of three wash cycles: normal, wash-'n'-wear, and gentle.
Norge Division

GAS·PEOPLE

JOSEPH J. HEDRICK is retiring as president of the Peoples Gas Light & Coke Co., Chicago. REMICK MCDOWELL, executive vice president, succeeds him. ROBERT M. DREVS, secretary, was elected a vice president. Hedrick will continue to serve the companies in the Peoples Gas System in a consulting capacity and as a member of the boards of directors of the production, pipeline, and storage subsidiaries. Hedrick has been in the employ of Natural Gas Pipeline in various capacities since 1930, became president of that company in 1949, and president of Peoples Gas in 1957. McDowell, in his present post since 1957, came from Commonwealth Edison Co. in 1940, was elected assistant secretary in 1942. He became secretary of Peoples Gas in 1945, assistant to the chairman in 1949, and vice president in 1951. Drevs, with the company since 1933, served in various capacities in the accounts division and, in 1949, was elected assistant secretary and assistant treasurer. In 1954 he became secretary and in 1957 added the post of assistant vice president.

J. J. Hedrick
Peoples Gas

R. McDowell
Peoples Gas

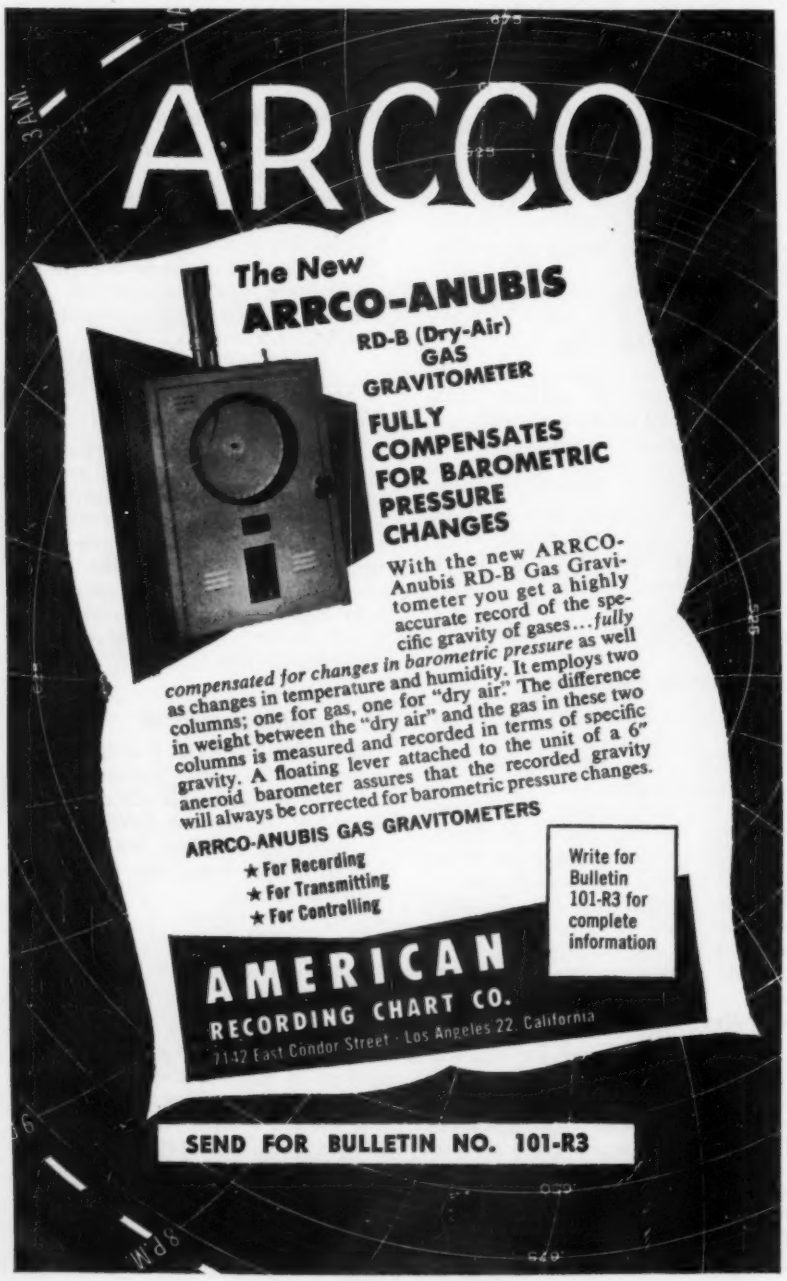
THEODORE W. LAUB has been promoted to administrative assistant to the general superintendent of Peoples Natural Gas Co., Pittsburgh. He will manage the operating department office in Pittsburgh and be in charge of the office administration of the operating and capital budgets. During his 13-year career with Peoples, Laub had headed the company's accounts payable department and was budget manager prior to his current promotion.

JOHN H. BRINKER has been named executive vice president of the J. I. Case Co., Racine, Wis. Brinker formerly was vice president and general manager of A. O. Smith's Permaglas division. He also was named to the Case board of directors.

FRANK T. HOUSE has been named sales promotion manager and HERMANN A. BURKHARDT publicity manager for Bucyrus-Erie Co., South Milwaukee, Wis.

New appointments for the Pacific region of Allis-Chalmers Industries Group include: J. A. LONGLEY, regional representative for transmission and distribution equipment; T. E. MEYERS, manager, San Francisco district; and G. K. LEWIS, manager, Portland district.

ROY V. LEONARD has joined Arkansas Louisiana Gas Co. as a special representative of the fiscal departments of the company and its subsidiaries. He will headquarter in Little Rock. Since 1943 Leonard has been the correspondent bank representative of the Mercantile Trust Co. of St. Louis and its predecessor banks.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ARRCO-ANUBIS
RD-B (Dry-Air)
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GRAVITOMETER
FULLY
COMPENSATES
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With the new ARRCO-Anubis RD-B Gas Gravitometer you get a highly accurate record of the specific gravity of gases... *fully compensated for changes in barometric pressure* as well as changes in temperature and humidity. It employs two columns; one for gas, one for "dry air." The difference in weight between the "dry air" and the gas in these two columns is measured and recorded in terms of specific gravity. A floating lever attached to the unit of a 6" aneroid barometer assures that the recorded gravity will always be corrected for barometric pressure changes.
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Robert Drevs
Peoples Gas

John Brinker
J. I. Case

H. P. Richmond
Ebasco

T. W. Laub
Peoples

Empire Stove Co., Belleville, Ill., has named the following regional sales representatives: S. R. QUINCY, northern Texas; FRANK J. BASHARA, southern Texas; DAVID L. SHAPIRO, northern Ohio and western Pennsylvania; GEORGE E. MERRITT, Idaho, Oregon and Washington; and C. WAYNE DORAN, covering the states of Arkansas, Tennessee, northern Louisiana and northern Mississippi.

HAROLD P. RICHMOND, a former vice president of Public Service Co. of North Carolina, has been named general gas consultant in the management consulting division of Ebasco Services Inc. For the past seven years, Richmond has been in charge of the eastern division of PSCo. of North Carolina. He also was a member of the faculty of Duke University where he taught mechanical engineering. Four other additions have been made to Ebasco's management consulting staff. They include: CARL E. ANDERSON, PAUL L. GILL, CLINTON J. SAMMOND, and RAYMOND M. HOLMES.

RALPH C. FAUST JR. has been named district sales manager for Grayson Controls Division, Robertshaw-Fulton Controls Co. He will headquarter at the company's sales offices in Haddonfield, N. J.

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the Concentrated Fuel

GULF GULFTANE LP-GAS

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PETROLEUM CORPORATION
LIQUEFIED PETROLEUM GAS DIVISION
TULSA, OKLAHOMA

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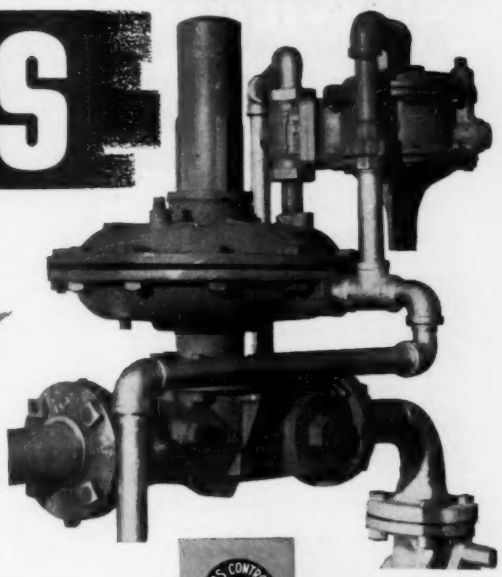
SENSITIVE, AUTOMATIC CONTROL FOR MORE CAPACITY ON LARGE GAS LOADS: Reynolds PL Series Gas Regulators are designed for any type of gas regulation requiring accurate outlet pressure conditions with normal capacities greater than 5,000 cu. ft./hr. Even regulation improves meter accuracy.

FOUR MODELS, Screw or Flange. Psi to Psi or Psi to oz. regulation. Reynolds PLP Series Pilots are designed for easy field maintenance.



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A SUBSIDIARY OF ARKANSAS LOUISIANA GAS COMPANY

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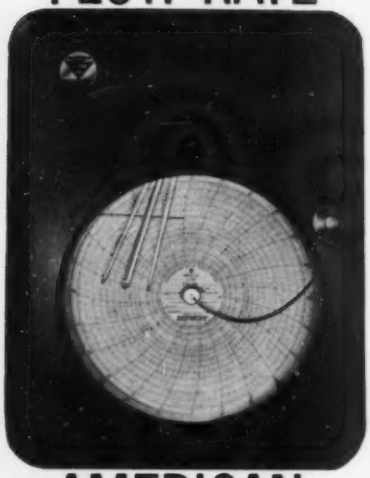

AMERICAN-WESTCOTT

A-88

ORIFICE METERS

Versatile American® Series A-88 mercury-type orifice meters meet the toughest flow measurement requirements – working pressures to 5,000 psi – interchangeable 10, 20, 50, 100 and 200-inch ranges. Recording meters may be equipped with 0-150° F. standard temperature element. Integrating meters integrate static and differential pressure, providing totalized flow indications. Telemetering equipped meters transmit integrated indications to remote locations.

- Manometer body easily cleaned – does not affect calibration.
- Tamper-proof calibration – simple, positive adjustment of float lever arm length.
- Interchangeable ranges – no manifold piping changes.
- Teflon-packed stuffing box is pressure tight, nearly frictionless, never needs lubrication.
- Teflon-packed pulsation dampener externally adjustable under full line pressure.
- Check valves give positive shut-off for over-range protection.

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Sales offices in principal cities

ARGO G. PISON is manager of quality control of Bridgeport Thermostat Division, Robertshaw-Fulton Controls Co., Milford, Conn.

JOSEPH A. LOVE is retiring as manager of the gas construction department of Pacific Gas & Electric Co., San Francisco. Succeeding him is M. H. CHANDLER. Love was associated with the construction of just about all of the 4000 miles of major transmission lines in the PG&E system, and has overseen much of the compressor station construction and other important parts of the PG&E network. He first joined the company in 1912. Chandler has been with PG&E since 1940. His most recent assignment was senior gas construction engineer.

A. L. MCCLELLAN, assistant treasurer of United Gas Corp., Shreveport, has retired. Succeeding McClellan is A. J. STEPHENS. And, succeeding Stephens is P. P. STAGG, formerly in charge of the general office accounting department of United Gas Pipe Line Co. McClellan has retired after nearly 32 years of continuous service with United.

JERRY D. WHEAT has been named administrative assistant in the president's office of Lone Star Gas Co. and Lone Star Producing Co., Dallas. Wheat has been supervisor of employment in the Dallas personnel offices since July 1958.

MAURICE F. MCGEE has been promoted to manager of the safety and training department of United Gas Corp. in Shreveport. Succeeding McGee as district employee relations supervisor at New Orleans is M. E. MCGUIRE. McGuire has been an engineer in the safety department in Shreveport.

Greenlee Tool Co., Rockford, Ill., has assigned these factory-trained men to sales territories: GENE SEYMOUR, covering Nebraska, Kansas, and Missouri; BILL FARLEY, Arkansas, Louisiana, Mississippi, and Alabama; BILL BRASMER, the Dakotas, Minnesota, northern Wisconsin, Iowa, and Michigan's Upper Peninsula.

G. B. MEAD is district sales manager for the Philadelphia-Camden area of Fulton Sylphon division, Robertshaw-Fulton Controls Co. He has been a sales representative of the company in that area since 1957.

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Heat and vibration-proof, non-solvent, will not shrink, crack or crumble. Makes all assemblies leak-proof and pressure-tight. Prevents rust, corrosion, joint seizure.

7 BASIC BLENDS

LIQUID WRENCH®

The super-penetrating rust solvent

LOOSENS rusted bolts, nuts, screws, 'frozen' parts

Liquid Wrench works *fast*... yet is absolutely safe for all metals and alloys.

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Charlotte, North Carolina

"W" Type Survey for downtown and commercial areas

includes street and building inspection. This Heath Leakage Control Survey accurately locates and classifies gas leakage. It reduces unaccounted for losses and gives the obvious advantage of a 3rd party Audit of your leakage situation.

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378 Washington St., Wellesley Hills 81, Massachusetts

CLIFFORD A. TERRY has been named chief tool engineer by Maxitrol Co., Detroit.

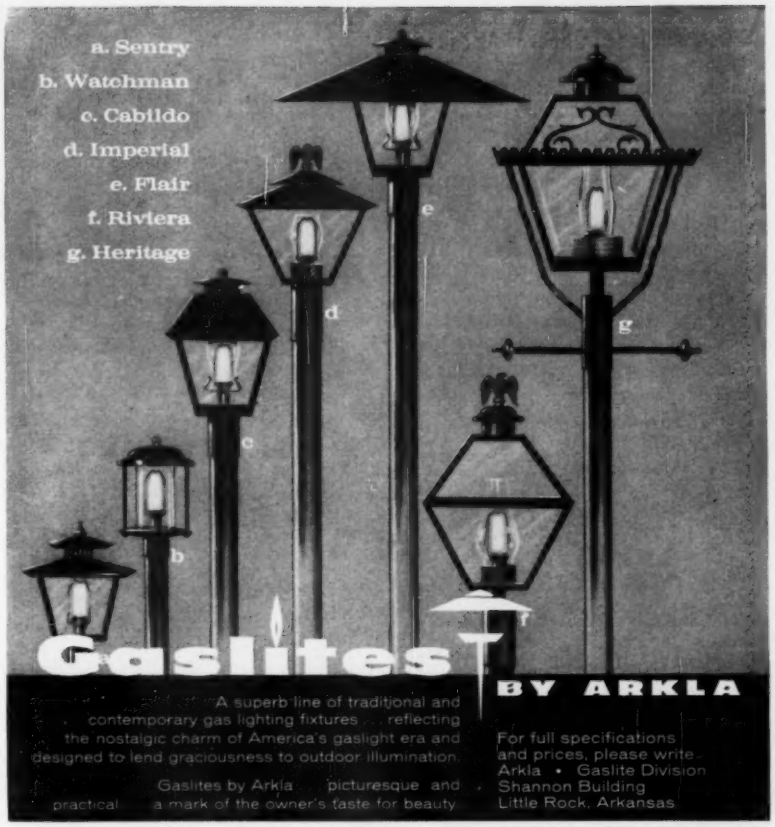
WILLIAM A. HEADLEE has been appointed manager of the Kansas City, Mo. branch of the A. Y. McDonald Manufacturing Co., Dubuque, Iowa. McDonald also announced the appointment of A. L. SACHS as chief product engineer and quality control director. He formerly was staff engineer with Crane Co.

EUGENE J. WALSH, formerly an engineer in the rate department at Ohio Fuel Gas Co., has been promoted to the company's legal staff. Before transferring to OFG, Walsh was in the engineering department of Columbia Gas System Service Corp.

Several appointments were made in the heating and air conditioning controls division of Controls Co. of America, Milwaukee. R. W. SLOANE is director of engineering-heating and air conditioning controls; R. E. LAW succeeds Sloane as product manager-oil heating products; and HARVEY B. WILGUS transfers to the division as assistant director of sales.

JIM EDWARDS has completed 52 years of full-time employment with Southern California Gas Co., Los Angeles, and is retiring as the unchallenged champ. And, unless employment practices change, allowing a man to begin sooner and stay longer, Edwards' claim to a record is not likely to be broken. He began his career with SoCal in 1907 at the age of 16. Starting as a fireman, Edwards has for the last several years been superintendent of distribution for SoCal's eastern division headquarters in San Bernardino.

United Gas Corp., Shreveport, has anounced several promotions. J. D. DAVIS, assistant to the president since 1957, has been elected vice president. He is a 34-year veteran with United. In his new post, Davis is in charge of coordinating all activities of the Texas and Louisiana-Mississippi distribution divisions. V. S. BRENNAN, director of personnel since 1955, is now director of sales and rates. Brennan joined United in 1934. W. D. PARKES is now director of personnel. With the company for 28 years, Parkes most recently has been training supervisor in the personnel department.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b. Watchman
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d. Imperial
e. Flair
f. Riviera
g. Heritage
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BY ARKLA
A superb line of traditional and contemporary gas lighting fixtures . . . reflecting the nostalgic charm of America's gaslight era and designed to lend graciousness to outdoor illumination.
Gaslites by Arkla . . . picturesque and practical . . . a mark of the owner's taste for beauty
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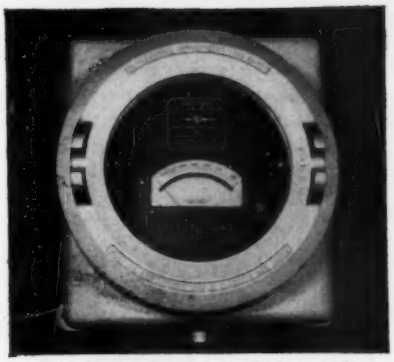
HASTINGS GAS FLOWMETER



Model FI-6 Indicator in explosion-proof case.

Type S-16B Gas Flow Probe

RANGE AND CALIBRATION — The indicator is furnished with a linear scale from 0-200. Calibration curves are available for air over the range from 25-6,000 feet per minute at S.T.P. or from 2-450 pounds per minute per square foot of cross sectional area. The greatest accuracy, however, is in the lower portions of these ranges, principally, from 75 to 1,000 feet per minute at S.T.P., and from 4 to 75 pounds per minute per square foot of cross sectional area. Calibration curves can be determined for most other gases and gaseous mixtures.

UL

APPROVED FOR Class 1, Group D HAZARDOUS LOCATIONS

This electrical instrument is the first of its type to be UL approved for use in the presence of certain flammable and explosive mixtures, Class 1, Group D. Indicator furnishes continuous, direct indication of mass flow in gas lines. 115-Volt 60 Cycle operated.

- EASILY INSTALLED — No orifices, Flanges or By-Pass Required.
- NO CORRECTIONS needed to compensate for temperature or pressure variations.
- CONTINUOUS DIRECT INDICATION.
- EXTREMELY SENSITIVE. Can even detect leaks in valves and control units.

HASTINGS-RAYDIST, INCORPORATED
HAMPTON 3, VIRGINIA

DONOVAN C. WISE has been named manager, operating plans and budget, for New York State Natural Gas Corp. He will headquarter in Pittsburgh. Wise has been southern division superintendent since 1957. Succeeding Wise in that post is SIDNEY S. GALPIN, with headquarters in Jeannette, Pa. Since 1957 Galpin has been production engineer in the company's central division.

S. S. Galpin
N. Y. State

Donovan Wise
N. Y. State

Milton Morgan
A. O. Smith

Milo Miller
A. O. Smith

Several production valve salesmen have been named by Grove Valve & Regulator Co., Oakland, Calif. New representative in the Rocky Mountain region, headquartering in Farmington, N. M., is J. W. LOWRANCE JR. Representative in the Oklahoma area, with offices in Oklahoma City, is DANIEL LEE NICHOLSON. GIL A. LASTRAPES JR. will represent Grove in the New Orleans area. He will headquarter in Harvey, La.

MILTON E. MORGAN has been named vice president of A. O. Smith Corp.'s Permaglas division in Kankakee, Ill. He succeeds JOHN H. BRINKER, who has joined J. I. Case Co. Morgan has served with A. O. Smith as assistant general sales manager for automotive parts, corporate purchasing director, and as a vice president. Newly named assistant vice president of the Permaglas division is MILO MILLER, who will continue to handle his previous duties as general manager of consumer products.

COL. WILLARD F. ROCKWELL, chairman of the board of Rockwell Manufacturing Co., was reelected a member of the National Industrial Conference Board for a one-year term . . . JAMES F. NOLAN is serving a three-year term as a national director of the American Right-of-Way Association. Nolan is superintendent of Ohio Fuel's right-of-way department . . . Whirlpool Corp.'s ROBERT W. ARMSTRONG has assumed additional public relations responsibilities. He has been promoted from manager of PR for the RCA Whirlpool sales department to general manager of PR for the company.

J. D. MCCALL has been appointed president of Columbia-Geneva Steel Division, U. S. Steel Corp., San Francisco. He succeeds LESLIE B. WORTHINGTON, newly elected president of U. S. Steel. McCall has been vice president-operations since 1957. Columbia-Geneva also announced the appointment of LEWIS W. ROE as comptroller.

Continued on page 90

THE *FINEST* FOR MODERN GAS DISTRIBUTION SERVICE

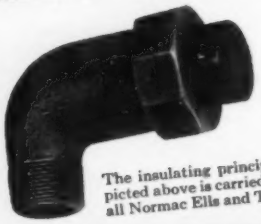
NORMAC

Malleable Couplings

Normac Insulating Malleable Couplings and fittings are available with polyethylene inserts and semi-insulating gaskets or full insulating rubber gaskets.

Insulating Couplings AND Fittings

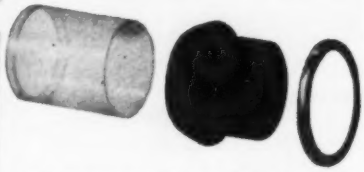
Malleable Service Ell



The insulating principle depicted above is carried out in all Normac Ells and Tees.

NORTON McMURRAY has specialized for 20 years in the development and production of products solely for the Gas Industry. Whether your plans include modernization, or new, expanded facilities, Normac Gas Distribution Equipment will serve you well.

Insulating Gaskets



The Normac insulating principle incorporates an efficient combination of a polyethylene sleeve and a semi-insulating gasket or full rubber gasket and retainer ring.

Brass Fittings

Normac insulating Brass compression end Tees, Ells and all compression end fittings are available with polyethylene inserts and semi-insulating gaskets or full insulating rubber gaskets in ¾", 1" and 1¼" iron pipe sizes.

New CATALOG

Write for your copy . . . it gives complete details and specifications of NORMAC equipment.

NORTON-McMURRAY Manufacturing Co.

919 North Michigan Avenue
CHICAGO 11, ILLINOIS

Couplings • Meter Bars • Sleeves • Cocks • Ball Joint Clamps • Service Tees and Ells

GAS CALENDAR

January

8..SGA Sales Section Round Table Conference—Paso Del Norte Hotel, El Paso.
11..Gas Appliance Engineers Society, West Coast Chapter—Swally's Restaurant Key Club, Los Angeles.
15..SGA Employee Relations Conference (Accident Prevention)—Captain Shreve Hotel, Shreveport.
20..NEGA Operating Division—Sheraton Plaza, Boston.
21-22..Florida-Georgia Gas Association Sales Conference—Tampa Terrace Hotel, Tampa, Fla.
22..Oklahoma Utilities Association Accounting Section—Tulsa, Okla.
28..NEGA Accounting Division—Statler Hilton, Boston.

February

24-26..11th Annual Corrosion Short Course—Mayo Hotel, Tulsa.
29-Mar. 2..AGA General Management Section Conference—Pittsburgh-Hilton Hotel, Pittsburgh.

March

14-18..National Association of Corrosion Engineers Annual Convention—Dallas.
21-23..Mid-West Gas Association Annual Meeting & Convention—Hotel St. Paul, St. Paul, Minn.
24-25..NEGA Annual Meeting—Hotel Statler, Boston.
24-25..Oklahoma Utilities Association Annual Convention—Biltmore Hotel, Oklahoma City.
30-April 1..GAMA Annual Meeting—The Greenbrier, White Sulphur Springs, W. Va.

April

5-7..AGA Sales Conference on Industrial & Commercial Gas—The Shamrock-Hilton, Houston.
8-9..Florida-Georgia Gas Association Convention—Biltmore Hotel, Palm Beach, Fla.
19-21..Southwestern Gas Measurement Short Course—University of Oklahoma, North Campus, Norman, Okla.
19-21..AGA Research & Utilization Conference—Hotel Carter, Cleveland, Ohio.
21-22..Indiana Gas Association—French Lick-Sheraton Hotel, French Lick, Ind.
25-27..AGA-EEI National Conference of Electric & Utility Accountants—Roosevelt & Commodore Hotels, New York.
25-27..Southern Gas Association Annual Convention—Galveston, Texas.

May

9-13..AGA Commercial Gas School—Edgewater Beach Hotel, Chicago.
9-13..AGA Operating Section, Joint Distribution & Transmission Conference—Hotels Roosevelt & Jung, New Orleans.
12-13..AGA Eastern Gas Sales Conference—Statler Hotel, Washington, D. C.
16-18..AGA Mid-West Regional Gas Sales Conference—Edgewater Beach Hotel, Chicago.
23-25..AGA Operation Section Production Conference—Hotel Roosevelt, New York.
24-26..Pennsylvania Gas Association Annual Meeting—Pocono Manor, Pa.

June

22-25..Canadian Gas Association Annual Meeting—Manoir Richelieu Hotel, Murray Bay, Que., Canada.
27-28..Michigan Gas Association Annual Meeting—Grand Hotel, Mackinac Island, Mich.

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PERFORMANCE

the All-New . . .
UNI-MATIC Gas Unit Heater

Take a *good* look at Peerless and you'll discover how the Peerless Uni-Matic delivers more performance, more efficiency. Peerless was first to offer combustion chambers made entirely of corrosion-resistant *aluminized steel. Cast iron* gas *burners* are produced, machined and *controlled* in Peerless' own plant. A *summer fan switch* is provided for manual control of air circulation.
Peerless Uni-Matic Gas Unit Heaters — all AGA approved — are available in both propeller and blower models from 25,000 thru 200,000 b.t.u. Available for natural, LP, mixed or manufactured gases.

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HEATING & AIR CONDITIONING EXPOSITION
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"DA" Dry-Type

Gives better than 98% efficiency on 2-micron mean diameter particles and 100% filtration on 5-microns or larger. Suitable for installations where—oil-free air is required; extremely high degree of filtration is required; where air velocity varies from one period to another; where dirt concentration is relatively low. Can be sized to meet any pressure drop requirement. Ask for Bulletin DA-1056.

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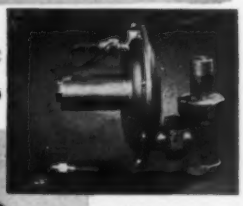
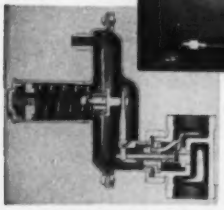
GAS SERVICE REGULATORS FOR CONVERSION OR PRESSURE ELEVATION

A REGULATOR, BREATHER VENT AND CATHODIC INSULATOR IN ONE PACKAGED UNIT





U. S. Patent No. 2,577,480. Other Patents Pending.

TYPE 51-R FOR EVERY INSTALLATION

EXCLUSIVE FEATURES NOT FOUND ELSEWHERE!

Exceptionally high relieving capacity obtained by new type internal relief valve. Remarkable by-pass check valve prevents over-shooting of low pressure and damage to meter.

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CONTROLS CORPORATION
P. O. BOX 13122 WALNUT HILL STA.
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90% cut in operating and maintenance cost means

CASH in the BANK for you!

New, transistorized M-SCOPE PIPE FINDER only $189.50

Rugged, transistorized construction practically eliminates maintenance cost . . . extends battery life to a year or more. Pinpoint accuracy, greatest depth penetration make the M-scope first choice in the field!

Send for FREE 1960 Catalog

FISHER
Research Laboratory, Inc.
Dept. G-4, Palo Alto, Calif.

people • *Continued*

ALLEN M. WOROB has been named assistant division manager on the New York metropolitan area by Caloric Appliance Corp. . . . FRANK M. REPASS has been named chief sales engineer for Crosby Valve & Gage Co., Wrentham, Mass. . . . R. A. GONZALEZ has assumed the newly created post of manager of industrial sales in the packaged heating and cooling department of Chrysler Airtemp . . . FREDERICK J. PICHARD is assistant director of marketing and DONALD A. SWARDSON is manager of abrasive and Long-Lyfe parts sales at Wheelabrator Corp.

Deaths

N. HENRY GELLERT, 70, retired president of Seattle Gas Co., died recently at his home in Seattle. Mr. Gellert, associated with the company for 12 years, was one of the leaders bringing natural gas to Seattle. He retired in 1955. During his long career in the utilities field, Mr. Gellert served as an officer in many companies, including American States Utilities Corp., Southern California Water Co., Edison Sault Electric Co., Great Lakes Utilities Co., Atlantic Gas Co., and National Public Utilities Corp.

WILLIAM R. BOYD, 74, former president of the American Petroleum Institute and a nationally known oil industry leader for three decades, died recently in Teague, Texas. Mr. Boyd received the Medal of Merit, the nation's highest civilian decoration, in 1946 for his work as chairman of the Petroleum Industry Council for National Defense in World War II. He retired from the presidency of API in 1949. Mr. Boyd joined the API staff in 1920 as assistant general secretary and counsel. He was elected executive vice president in 1929 and API president in 1941.

JULIAN NARDI, 62, chief mechanical engineer of Ford, Bacon & Davis Inc., was among the 26 persons who died in a Piedmont Airlines plane crash late in October in Virginia.

The R. W. STAFFORD CO.
GAS CONSULTANTS—ENGINEERS—CONSTRUCTORS
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Plant Management and Operation
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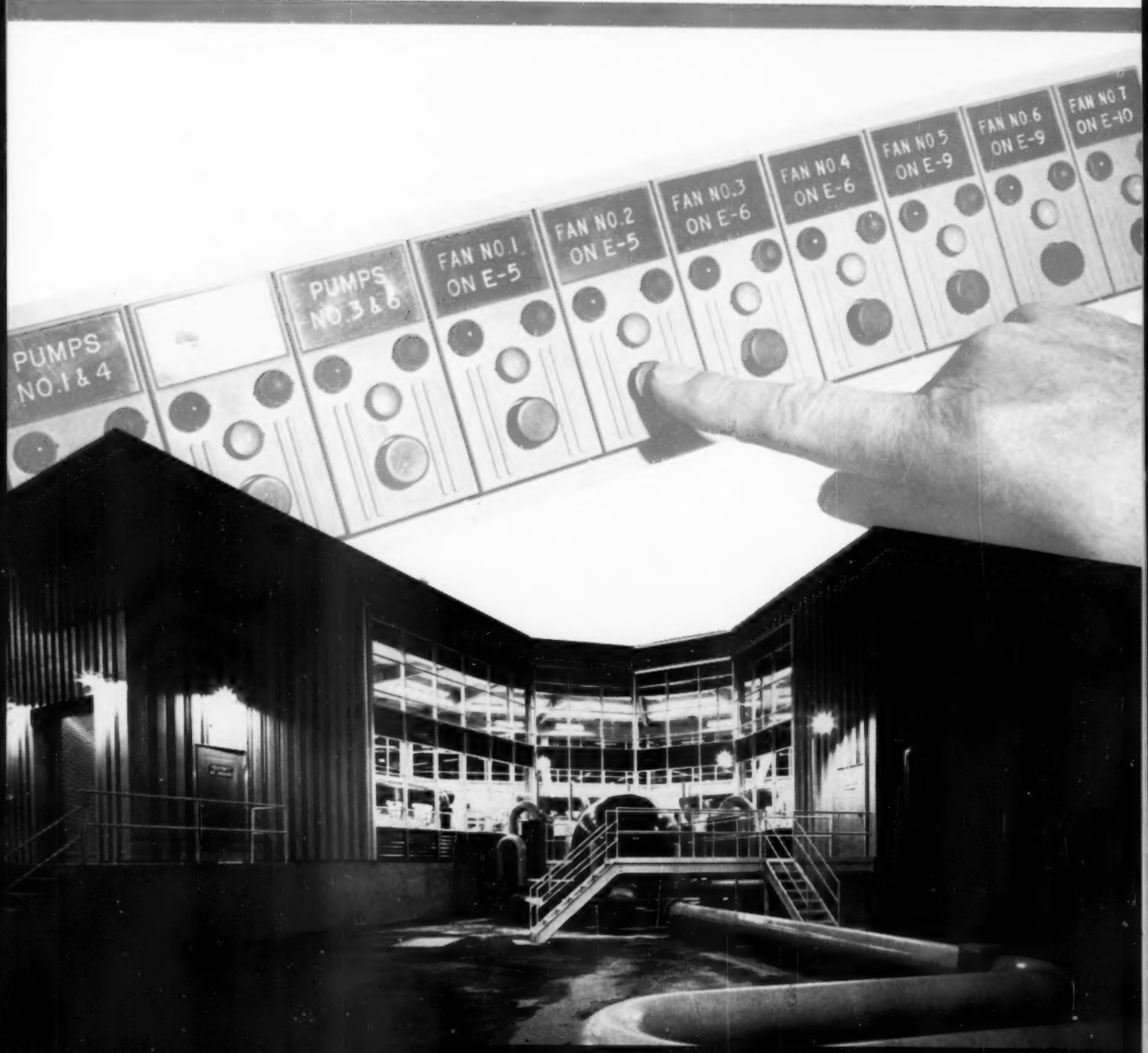
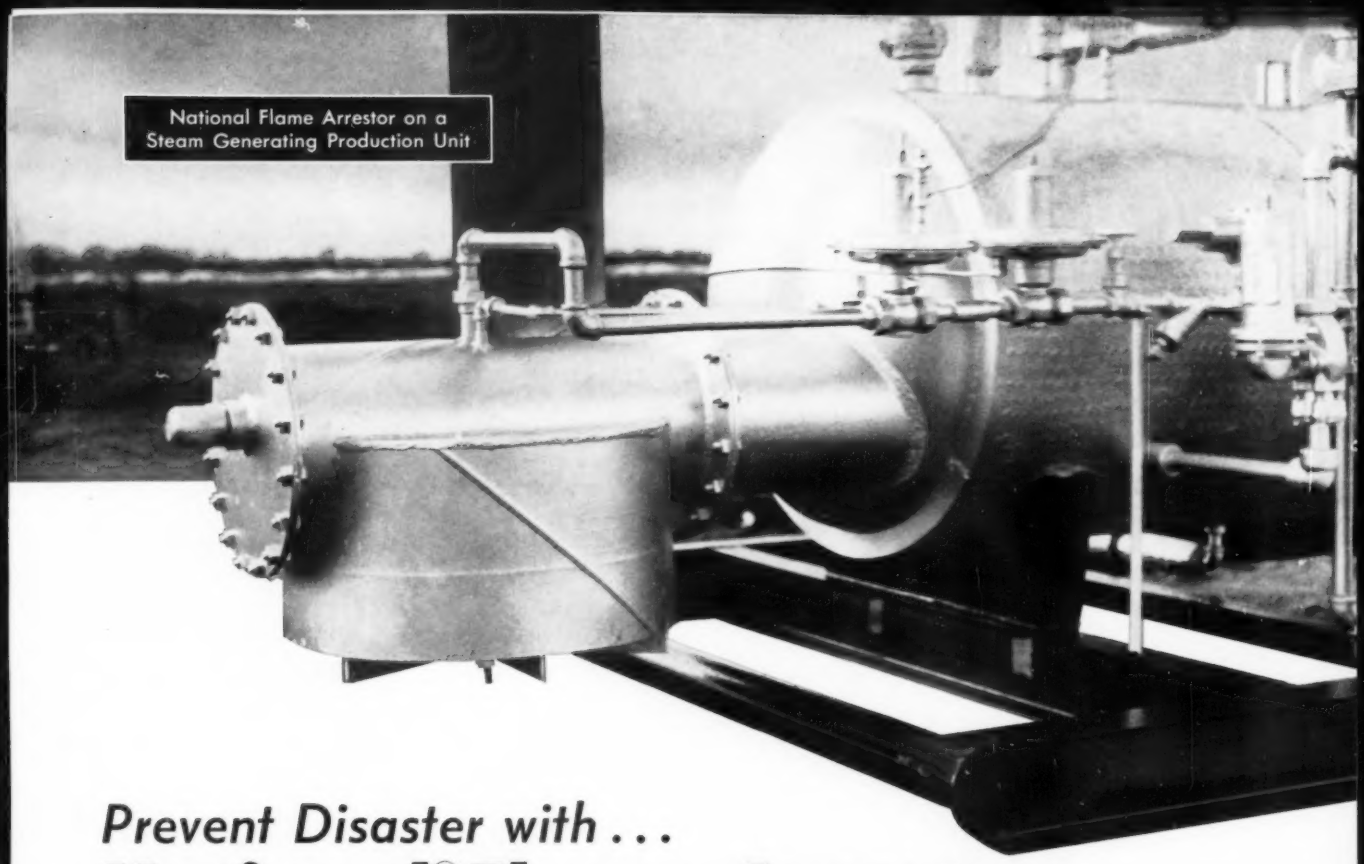
GAS

PIPELINE SECTION



PUSHBUTTON COMPRESSION



National Flame Arrestor on a Steam Generating Production Unit

Prevent Disaster with . . .

National® Flame Arrestors

PROTECT LIFE AND PROPERTY ON YOUR LEASE!

❶ Stops all flame propagation outside of the firetube on which the unit is installed.

❷ Withstands any explosion inside the tube.

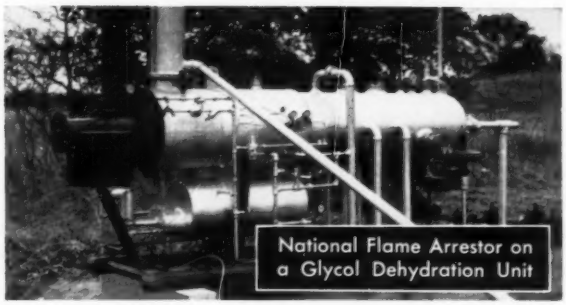
❸ Prevents any flash from going through the element.

❹ Welded, heavy steel construction. (No castings to crack in case of rapid or uneven cooling in event of rain, snow, sleet, etc.)

The National-designed Arrestor has been field and laboratory tested, proven, accepted and in use over a long period of time under extreme climatic conditions; in service on offshore platforms in the Gulf Coast with hurricanes, rain, wind and salt spray; in service in Canada where temperatures drop to −50° F with snow, ice and wind.

Available in two types for installation on all existing fired production units. Both types can be supplied with push-button pilot lighters or the automatic robot pilot.

A. The push-button pilot lighter in conjunction with the arrestor enables the lease operator to manually light the pilot in the firetube with no danger of flash back or explosion.



National Flame Arrestor on a Glycol Dehydration Unit

B. The automatic robot pilot will automatically light the pilot with no attending personnel and will automatically shut off the gas supply in case of failure of any part of the burner system.

Install National Flame Arrestors on existing equipment and specify National Flame Arrestors on all future purchase of field equipment to insure maximum safety for life and property.

THE NATIONAL FLAME ARRESTOR CONTAINS THE PROPER ARRANGEMENT OF ALL NECESSARY COMPONENTS TO MAKE A PERFECT ARRESTOR — ANY LESS IS POSITIVELY INADEQUATE AND DANGEROUS . . .

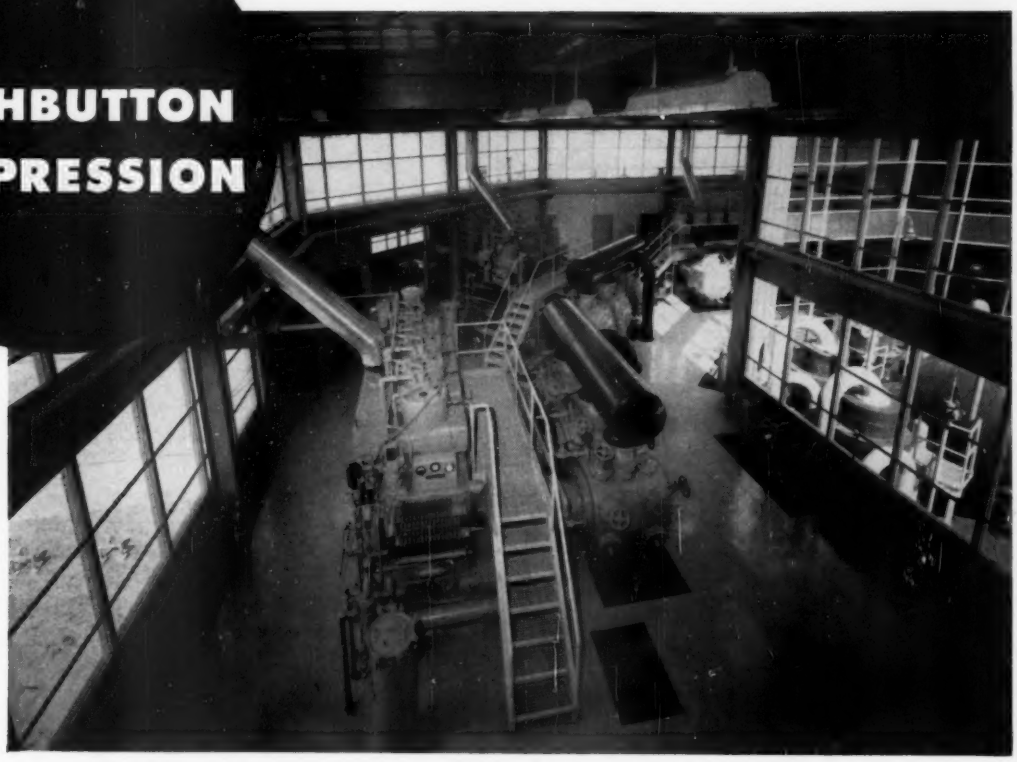
It's a National®

NATIONAL TANK COMPANY

DRAWER 1710

TULSA, OKLAHOMA

PUSHBUTTON COMPRESSION



- **Automated flow**
- **Spherical suction header**
- **"Biggest" holder —**

All describe the new circular compressor station in Long Beach, Calif.

By JAMES JOSEPH

GAS exclusive

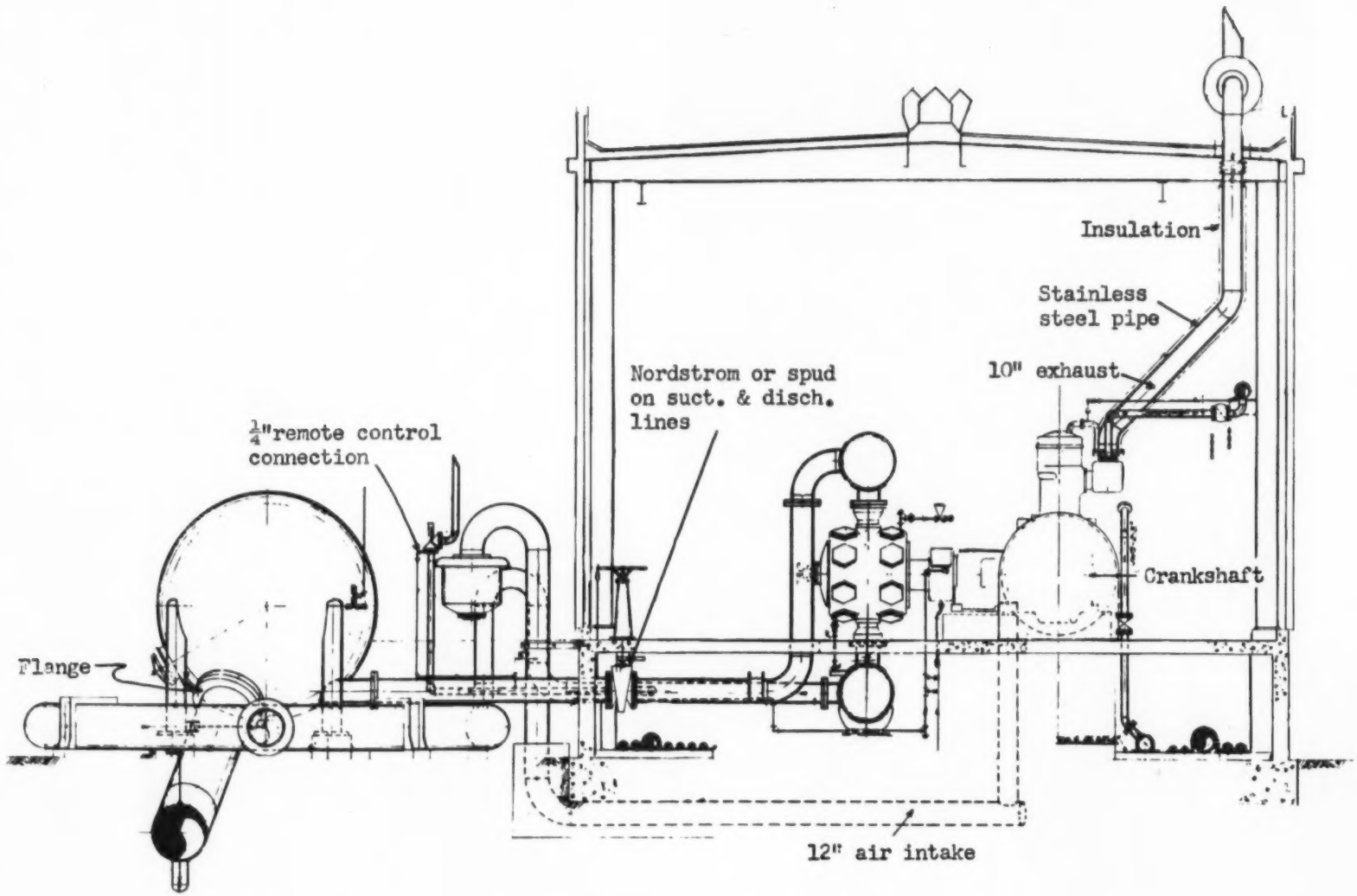
AT a desk-like console, station operator G. G. Anderson presses a button labeled "Valve E." Before him, a light flashes green, indicating that Valve E—in the distribution system—is open. Simultaneously—on the control room's wall-wide systems schematic—a Valve E indicator comes on, pinpointing the valve graphically, a visual confirmation of console action.

Pushbutton controlled, the City of Long Beach (Calif.) gas department's compressor station No. 6, fourth in the municipally owned system is on the line.

On the line, too, are the plant's four 550-hp Clark HSRA-4 gas-engine driven reciprocating compressors, its console-valved piping complex and its big gas-holder (214-ft diameter, 174 ft high, capacity 5 MMcf), said to the world's largest dry seal type holder.

But the spanking new $2.5 million station, whose 1.5 MMcfh capacity ups Long Beach's system total some 25 per cent, is as unique flow-wise as it is uniquely automated: The plant, both in design and concept, is built around a 10-ft diameter suction sphere which replaces—and largely substitutes for—

Four Clark engine-compressors are arranged in circle around suction sphere (seen through window at right). Note the three valve stands for each engine, which manually control bypass, suction and discharge to each.



Compressor building diagram shows suction sphere, the doughnut discharge header and how typical compressor is served.

normally long and costly suction headers.

"The suction sphere," points out gas department superintendent Leonard L. Bendinger, "is hub of things."

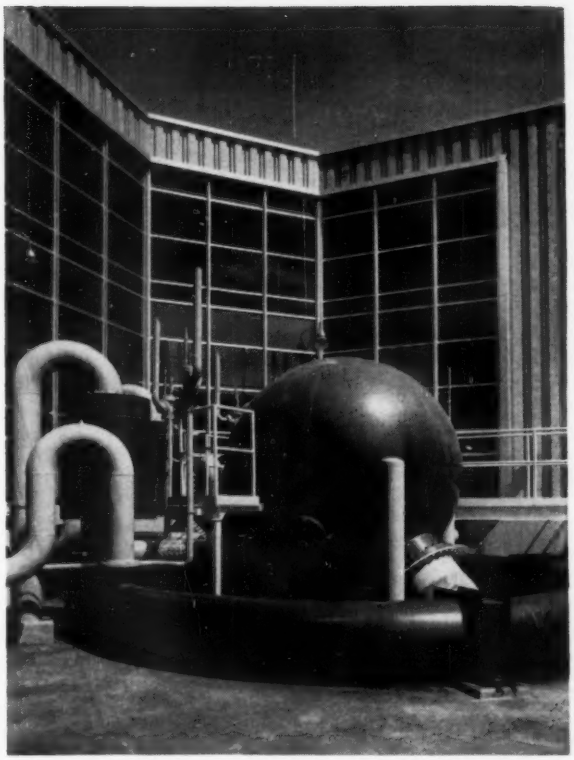
And, in fact, it is. Like the hub of a wheel, the sphere supplies the four 4-cylinder Clarks via short-run (12-ft) suction laterals—possibly the shortest, most efficient flow design ever incorporated into a compressor plant. Discharge—to a single, circular header—is equally short-run (12-ft).

Designed by consulting engineers M. A. Nishkian & Co., Station 6 goes literally around in circles—with economic purpose.

Installed in a semi-circle within the octagonal-shaped compressor building are the four Clark engines. Circular, too, is the closed, "doughnut"-shaped, 24-in. diameter discharge header—into which the short laterals feed. Dead-center of the doughnut rears the big volume, low pressure (maximum about 50 psig) suction sphere—which receives natural gas either from the big Wiggins holder or, in some cases, directly from the plant's Fluor scrubber (its capacity 31 MMscfd at 18 psig).

Explains the department's assistant superintendent, Norman Savidge, "the suction sphere, in practice, replaces the usual headers. And because it's mounted midcenter of the compressors, both suction and discharge laterals are not only extremely short, but equal length . . . allowing an almost perfectly uniform distribution to each compressor."

Essentially dual-purpose, Station 6 receives natural gas purchased (on a 25-year contract) from Southern California Gas Co. via a 20-inch line at a maxi-



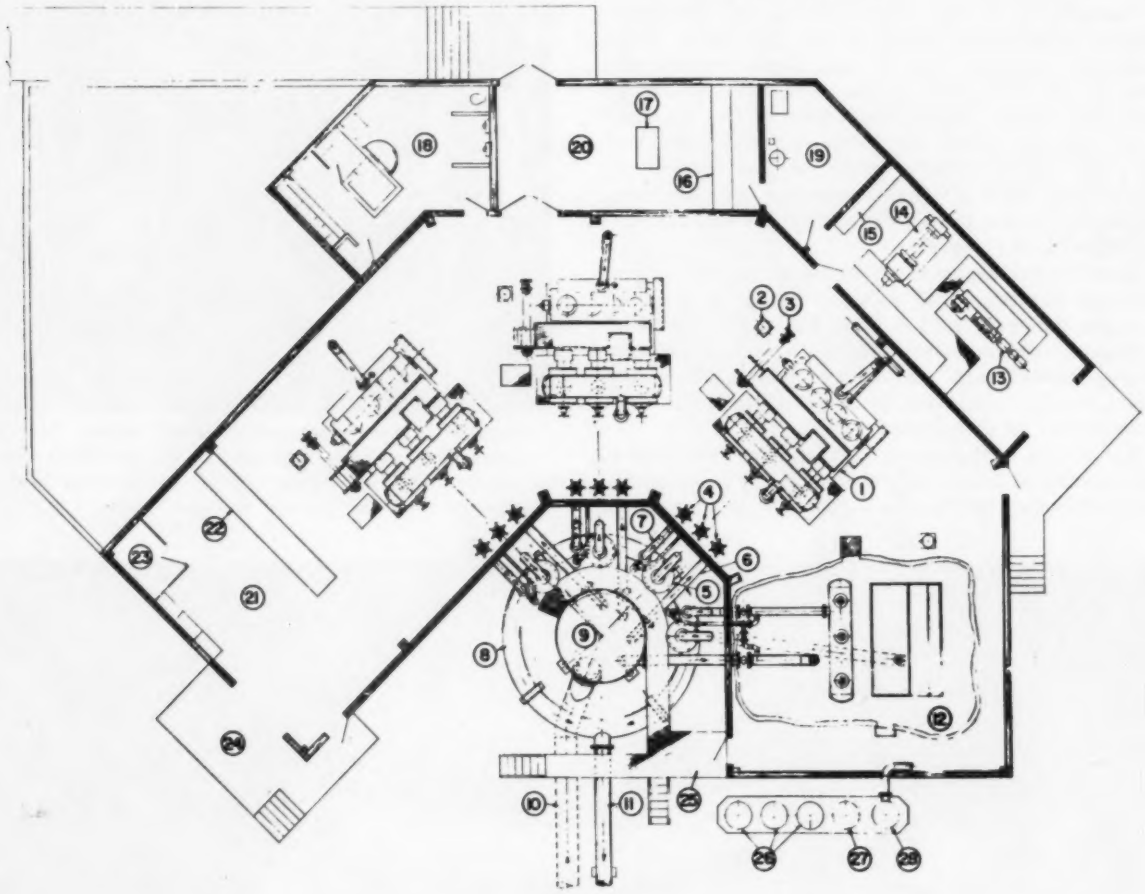
Close-up of suction sphere and associated piping. Seen is doughnut discharge header and some of the oil-bath air filters serving the four Clark engines. Below is the discharge header which outlets from the doughnut discharge header.

mum 148 psig. Gas is regulated through a Fisher governor, routed through a Robinson orifice meter, then goes through another regulator.

Incoming gas may be piped directly to a nearby major consumer (an electric utility's steam plant) which uses 125 psig. Or, it may be regulated down to 20-30 psig, the Long Beach system's pressure . . . and piped into the distribution net. Or, incoming gas may be regulated, scrubbed through the Fluor unit, and stored in the big 5-MMcf holder (from where, at a scant .5 psig, it's piped via a single 30-in. suction header to the operational suction sphere, boosted through the compressors to upwards of 30 psig, and routed to City of Long Beach distribution).

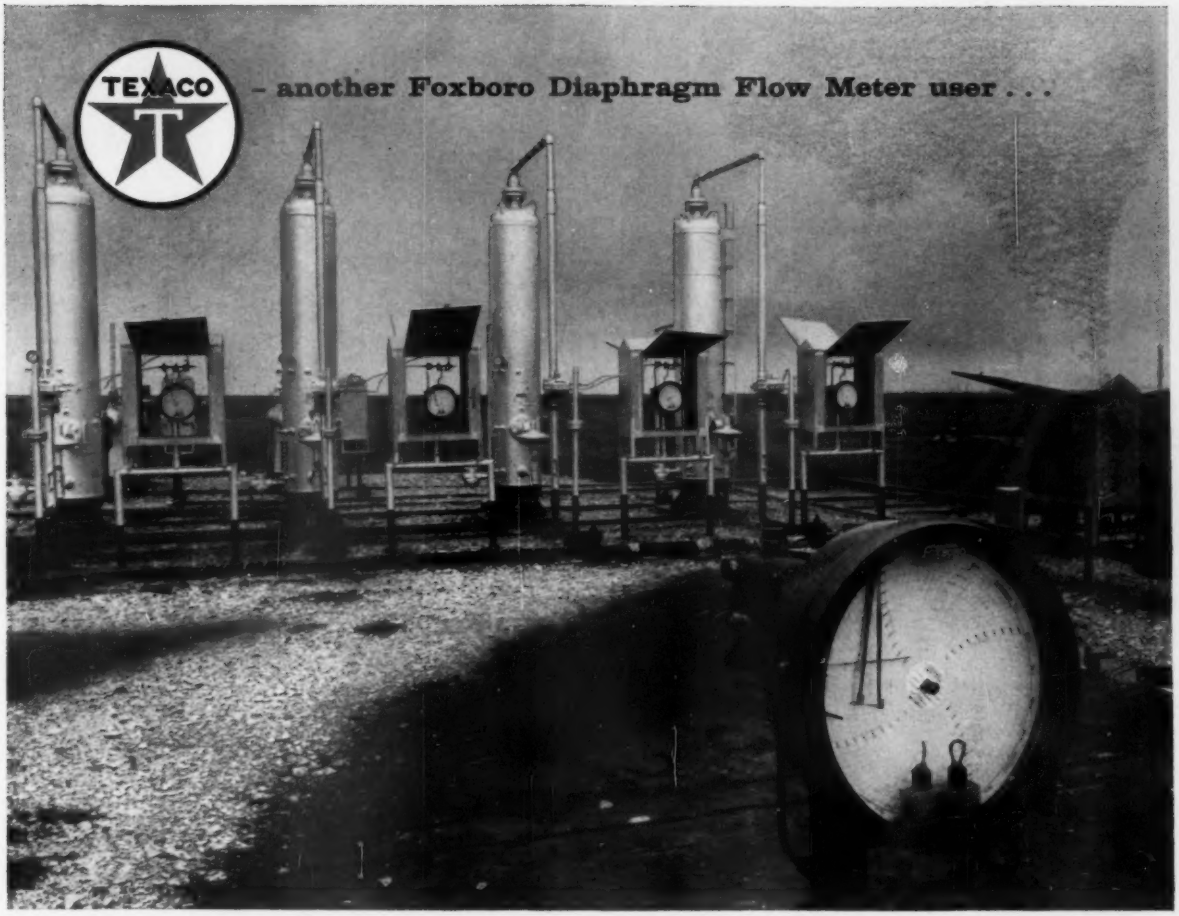
Out of the compressors, gas is routed through either of two Risto-Brugger E2RS evaporative gas coolers,

At compressor station #6 things go around in circles with purpose. Circular concept heralds new design for compressor stations



LEGEND

1 compressor
2 lube oil filter
3 lube oil cooler
4 floor stand-type valve operators
5 air intake filter
6 compressor suction
7 compressor discharge
8 plant discharge ring
9 plant suction sphere
10 gas suction from holder
11 gas discharge to coolers
12 typical below-floor piping
13 air compressor
14 emergency generator
15 power panel
16 control panel
17 supervisor control panel
18 wash and change room
19 heater and ventilator room
20 operator and control room
21 maintenance
22 work bench
23 tool crib
24 loading dock
25 access walkway
26 air receivers
27 oil cooler surge tank
28 jacket water surge tank



Texaco's Stowell Field, Winnie, Texas — Foxboro Type 37 Diaphragm Meters used on billing service.

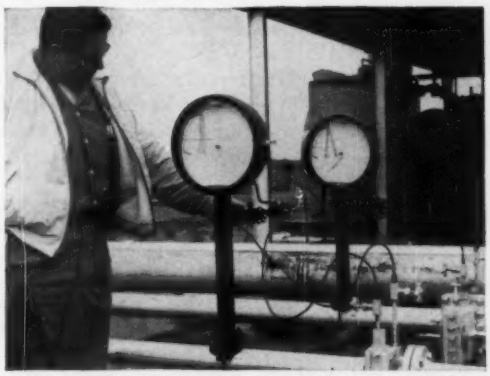
Foxboro Diaphragm Meters eliminate costly mercury maintenance, damage from overrange

There are over 50 Foxboro T/37 Diaphragm Flow Meters in Texaco's East Texas gas fields. Some measure flare gas and gas flow to compressors while others handle billing assignments.

Foxboro Diaphragm Meters give users two distinct benefits. First — since there is no mercury to clean, or replace, they're cheaper to maintain. Second — since the T/37's unique diaphragm assembly can't be damaged by overrange, line surges and winter freeze-ups cease to be a problem.

As for accuracy — monthly checks have found only two of the 50 meters that ever needed recalibration.

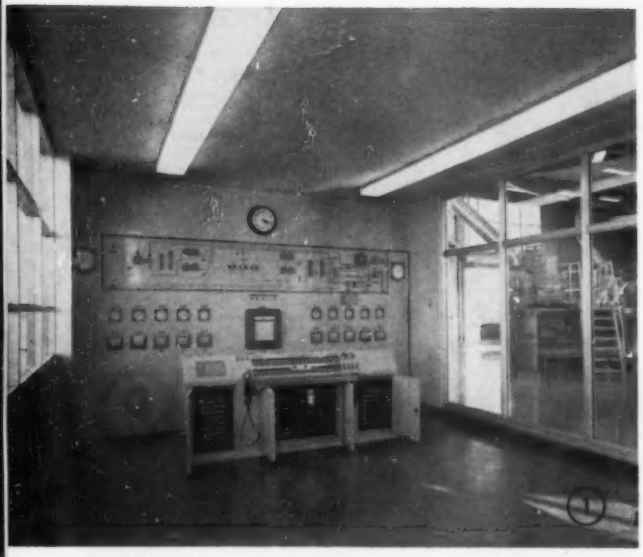
Producers, pipeliners, plant men — they're all reporting superior flow metering with Foxboro Diaphragm Flow Meters. Get full details from your nearby Foxboro Field Engineer. Or write for Bulletin 7-15. The Foxboro Company, 341 Norfolk Street, Foxboro, Massachusetts.

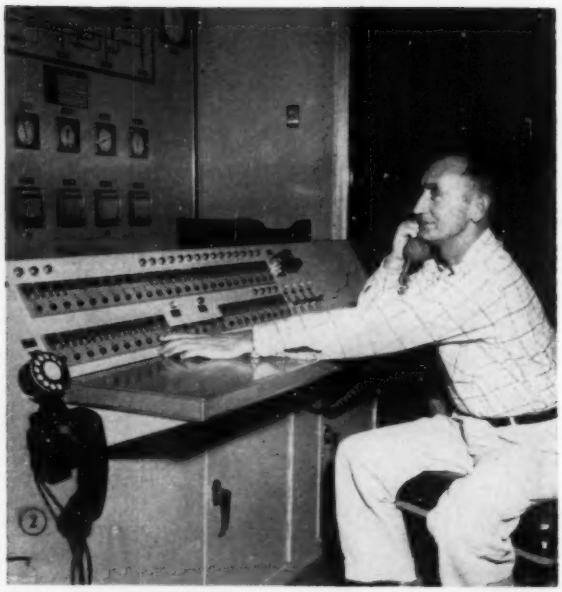


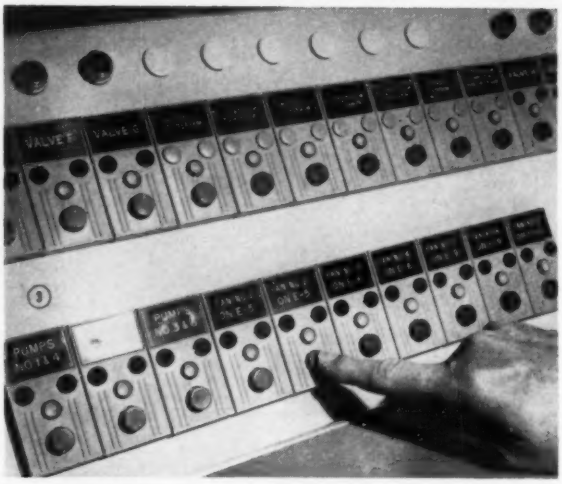
Texaco's Cody Field, Clarkwood, Texas—Foxboro Diaphragm Meters measuring flare gas, and gas flow to compressor.

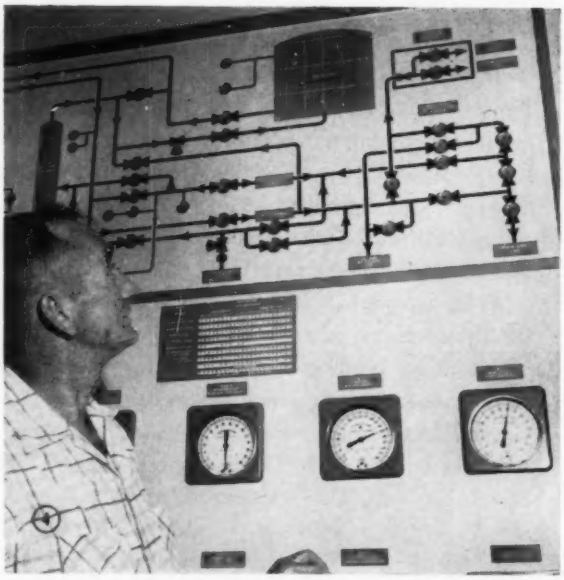
FOXBORO

REG. U.S. PAT. OFF.









1—Centralized control is from this room immediately off engine room. The function of every valve, motor and pipe in plant's distribution system is remotely controlled by supervisory console and confirming visual wall-wide graph.

2—Supervisory panel. Operator need merely push proper buttons in sequence to pick and choose between eight "programmed" distribution flows. Confirmation comes when valve-motor indicaters light on board before him.

3—Close-up of supervisory console panel showing how each pump, motor, valve and fan position is monitored by indicator lights.

4—Close-up of the wall-wide systems schematic.

the outlet temperatures about 90 degF.

Currently, Long Beach annually consumes about 21 billion cu ft of gas yearly. Upwards of 50 MMcfd is purchased from SoCal. Another 20 MMcfd comes from wells in the Huntington Beach oil fields. City-owned wells in the Long Beach field supply an additional 25 MMcfd.

Station 6, as a dual purpose plant, compresses holder gas as well as gas delivered to the city system from wellheads.

Pushbutton control for all plant flow is centralized in the station's operations room. Facing the big wall-wide Swanson Engineering & Mfg. graphic systems-schematic is a Westinghouse supervisory console.

The console—with an assist from four remotely located transmitter stations (which control, monitor and report the function of flow components)—can route gas through eight "programmed" piping complexes.

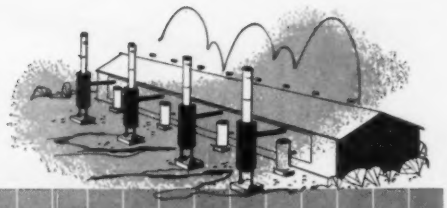
Consider the "Holder to City System" program. An operator need merely follow the program's instructions "open valve A," "close B," "close C," "open E," etc.—to route gas from the plant's big Wiggins holder, through the compressors, and to city distribution.

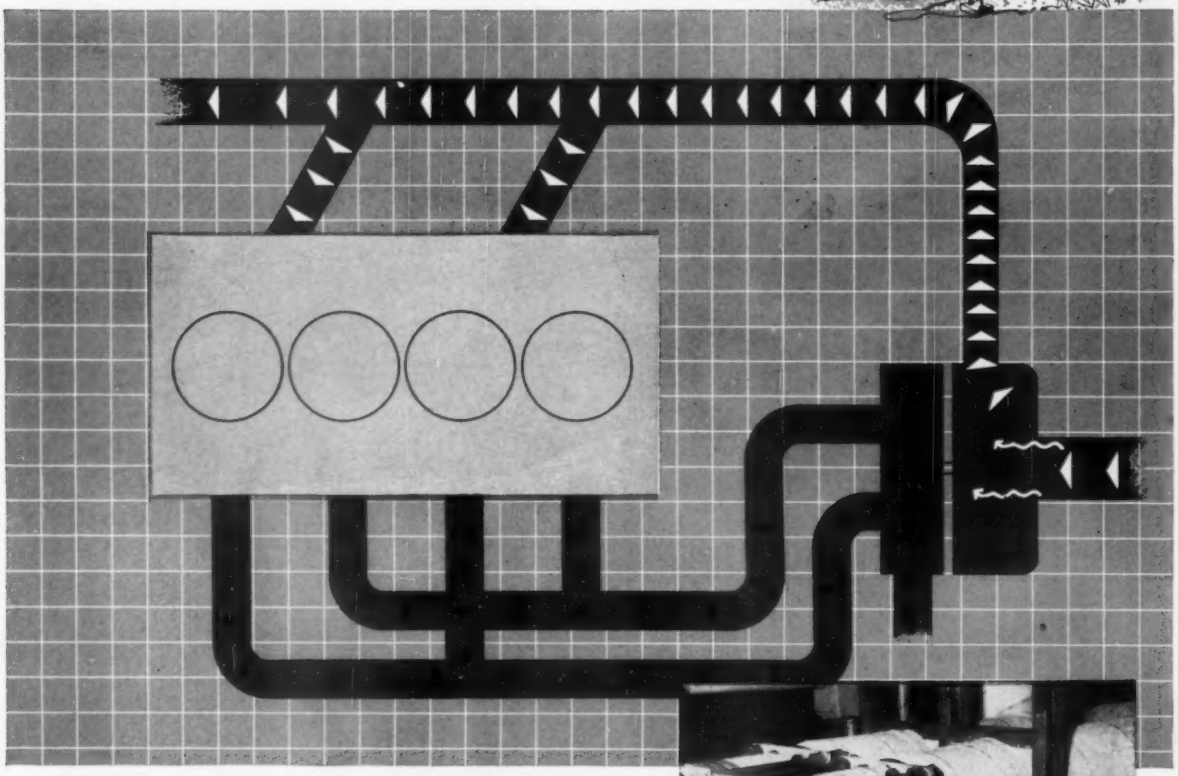
Involved is not a manual movement. Seated at the supervisory control, the operator merely pushes a

Continued on page 102

Flexonics

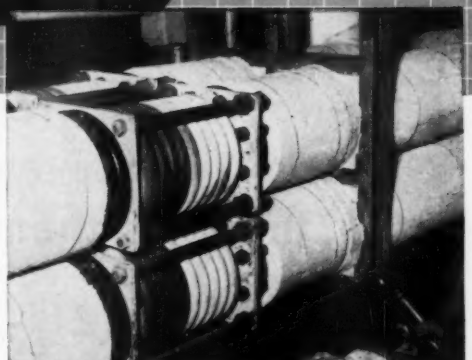
has the engineering experience to help you solve exhaust expansion problems when you turbocharge compressors





Here's a lively subject – *increasing gas pipeline capacity by turbocharging existing compressors in the field.* If you want the answers to the expansion problems that arise when the exhaust piping becomes an integral part of the operating loop, call on FLEXONICS engineers. They have the *specific* experience in this field that can mean actual dollar savings to you.

Write today for your free copy of this easy-to-read report. It tells you the dollars-and-cents facts that led an important pipeline company to a complete turbocharging program.



Special-design FLEXONICS Expansion Joints in the exhaust piping of a newly turbocharged compressor station.

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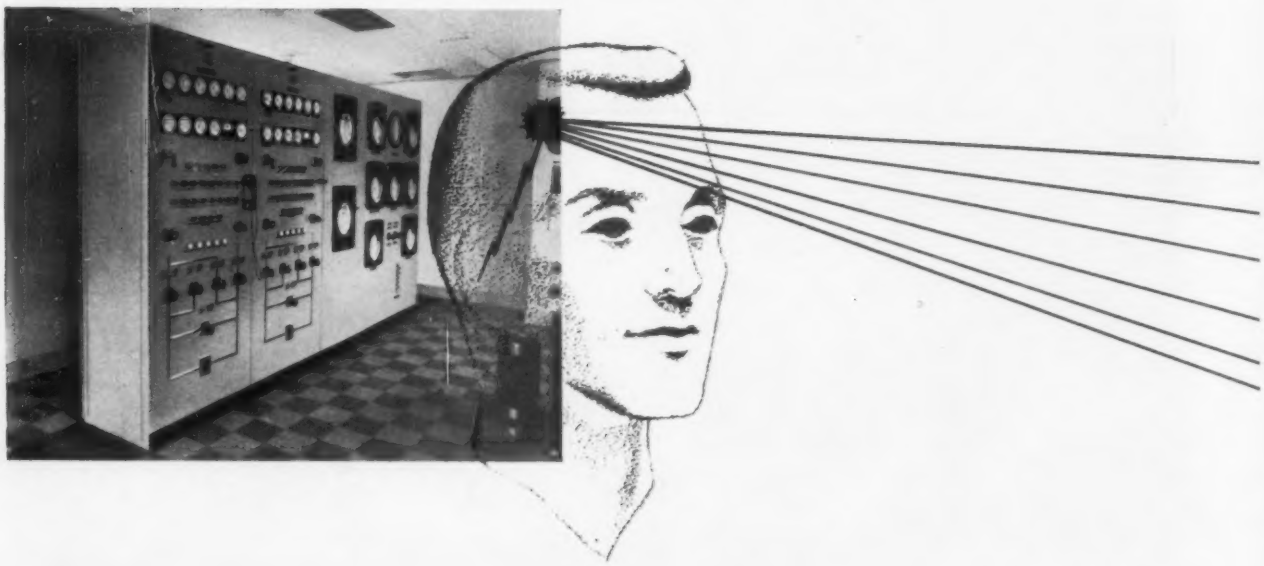
IR Tendamatic® control... for unattended



IR engine-compressors with Tendamatic control operate themselves, protect themselves... truly, think for themselves!

Tendamatic control is available only for Ingersoll-Rand compressors... for any requirements, any service.

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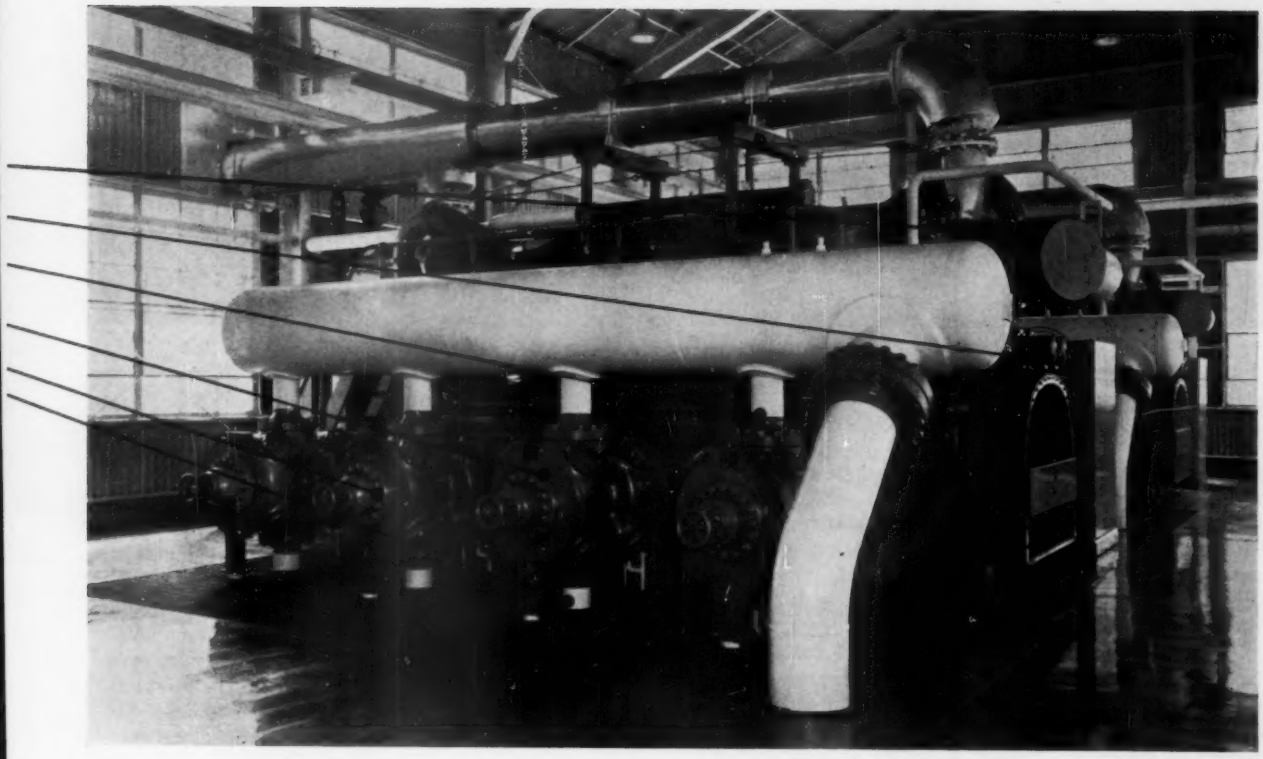

With an Ingersoll-Rand Tendamatic control system, all phases of compressor startup, regulation, supervision and protection may now be executed automatically or by remote control. Thus the compressor plant is made independent and self-sustaining, and may be left to "think for itself".

On engine startup, all operations are performed in proper sequence and the unit is put on the line. During operation, engine and compressor are completely, *automatically* protected against any abnormal condition. On shutdown too, all operations are performed in sequence. In case of trouble, Tendamatic control gives warning, indicates the source, and if necessary, shuts down the unit.

These automatic control systems are the product of Ingersoll-Rand's Tendamatic Control Division—a specialized group of engineers and experienced production men whose job is the development, design, manufacture and application of control systems for all types of compressor installations. For more information, call your I-R representative or write for Form 3276.

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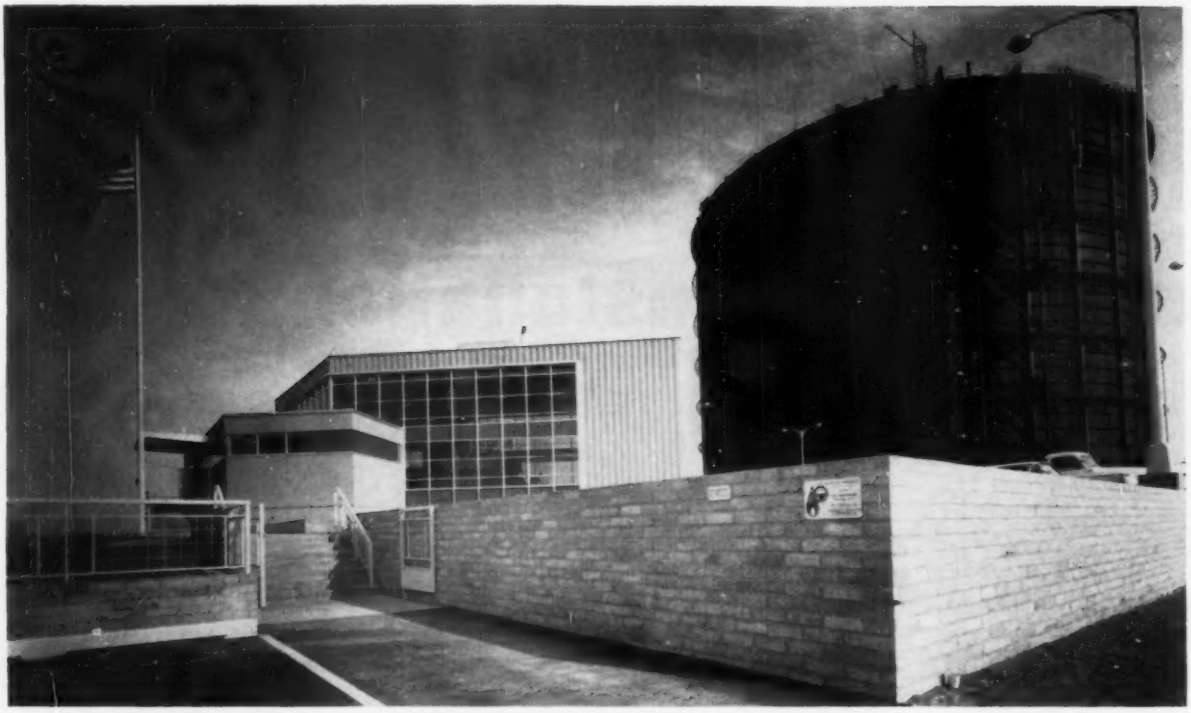

Big Wiggins holder looms over new compressor station.

PUSHBUTTON COMPRESSION

Continued from page 98

half dozen or more buttons. Activated in proper sequence (according to the "program"), the console's buttons, operating relays, signal component controllers (the majority of them pneumatic). When a valve or motor responds to a pneumatic command, its compliance is confirmed both on the console and on the wall-hung systems schematic.

Immediately signalled is any plant malfunction. For "process variables"—gas pressure, flow rates, temperatures and chemistry—are continually compared to control settings of each flow component's controller or recorder. Should a signal exceed or fall below a predetermined limit, an electrical contact activates, sounding a control room alarm and energizing warning lights both at the console and on the graphic systems-schematic.

Typically, each valve position on the console is monitored by four lights: green, red, white and amber. White confirms that the signal circuit is operative to the valve (or perhaps, to a motor).

Valve Position	*Indicator Light*
open	green—steady
closed	red—steady
intermediate	amber—steady

Similar console indicators signal the condition of various plant processes:

Process Condition	*Indicator Light*
Normal	Green light on steady
Abnormally high	Red light flashing, horn sounds
Acknowledge (confirms that control signal has reached controller or component)	Red light on steady
Abnormally low	Amber light flashing, horn sounds
Acknowledge	Amber light on steady

Explains one plant designer, "essentially, all plant 6 flow, its every valve and motor, is remotely monitored and controlled from the Supervisory console, and the control confirmed visually on the systems-schematic positioned just in front of the console. The only remaining manual operations involve the compressors—such as valves on lube oil and jacket-water coolers and floor-stand valves controlling suction, discharge and by pass lines to and from each compressor."

Concedes another engineer, "we simply couldn't justify the expense of automating these particular controls . . . which are close by the control room and which, normally, are but occasionally actuated."

But Station 6's purposeful wheel-and-hub design doesn't end with compressors and suction sphere. Ringing the compressors are auxiliary rooms and their gear: an Ingersoll-Rand ES-2, two-stage air compressor driven by a 25-hp motor (supplying instrument and engine-start air), and a gas-fueled 100-kw emergency electric set (its Waukesha 145 GZ natural gas engine driving a Fairbanks-Morse generator).

The HSRA-4 Clarks, with a bore-stroke of 14 in. and rated 550 hp at 300 rpm, exhaust through Maxim silencers concealed atop the plant roof. Each engine is served by a Hilco Hyflo lube oil filter and by a

HERE'S AN EXAMPLE

Big special problem here was considerable moisture in gas and location in cold weather area. Valves with conventional side outlets would freeze up. Development of this design makes valve self-draining, keeps it operable and gas flow constant. Design also minimizes cutting or washing action where sand or other harmful solids are present.

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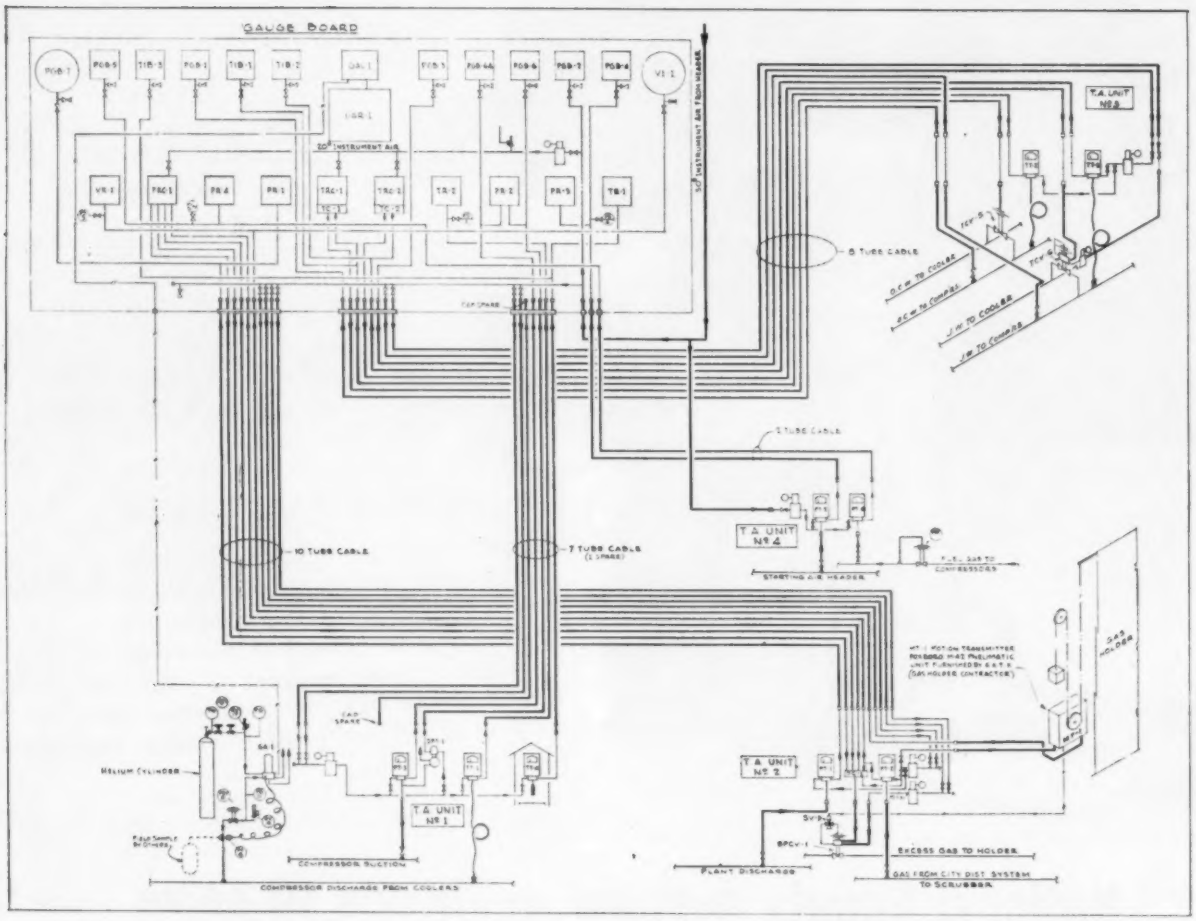
Instrument flow diagram of new circular compressor station.



INSTRUMENT SCHEDULE

No	TYPE	SERVICE	SIGNAL FROM	OPERATING RANGE	RANGE	
PGB-1	BOARD MOUNTED PRESSURE GAUGE	OIL COOLER WATER SUPPLY	LINE	40 PSIG	0	100
PGB-2	" " " "	INSTRUMENT AIR	"	50 PSIG	0	100
PGB-3	" " " "	JACKET WATER SUPPLY	"	32 PSIG	0	60
PGB-4	" " " "	STARTING AIR	PT-5	250 PSIG	0	500
* PGB-5	" " " "	COMPRESSOR FUEL GAS	PT-4	20	0	60
* PGB-6	" " " "	COMPRESSOR SUCTION	DPT-1	0-15" H_2O	0	30"
* PGB-6A	" " " "	" "	PT-3	0-50 PSIG	0	100
* PGB-7	" " " "	PLANT GAS DISCHARGE	PT-1	20-100 PSIG	0	200
* TIB-1	BOARD MOUNTED TEMP. INDICATOR	OIL COOLER WATER SUPPLY	TT-2	90° F	0	150
* TIB-2	" " " "	JACKET WATER SUPPLY	TT-3	150° F	0	200
* TIB-3	" " " "	AMBIENT AIR	TT-4	30-120° F	0	150
					** CHART RANGE	
PR-1	PRESSURE RECORDER	PLANT GAS DISCHARGE	PT-1	20-100 PSIG	0	125
PR-2	2PEN PRESSURE RECORDER	COMPRESSOR SUCTION	PT-3	0-50 PSIG	0	75
		" "	DPT-1	0-15" H_2O	0	25
PR-3	PRESSURE RECORDER	STARTING AIR	PT-5	250 PSIG	0	300
PR-4	" "	COMPRESSOR FUEL GAS	PT-4	20 PSIG	0	30
PRC-1	PRESS. RECORDER CONTROLLER	EXCESS GAS TO HOLDER	PT-2	18-50 PSIG	0	75
TR-1	TEMPERATURE RECORDER	AMBIENT AIR	TT-4	30-120° F	0	150
TR-2	" "	GAS DISCH. FR. COOLERS	TT-1	70-90° F	0	250
TRC-1	TEMP. RECORDER CONTROLLER	OIL COOLER WATER SUPPLY	TT-2	90° F	0	150
TRC-2	" " "	JACKET WATER SUPPLY	TT-3	150° F	0	200
* VI-1	VOLUME INDICATOR	GAS HOLDER	VT-1	0-SPANCP	0	5
VR-1	VOLUME RECORDER	" "	VT-1	0-SPANCP	0	5
GA-1	GAS ANALYZER	GAS ANALYSIS	—	—	—	—
GAR-1	GAS ANALYZER RECORDER	" "	GA-1	PER MANUFACTURER'S RECOMMEND.		

4 TO BE 3-15# LOW ELEMENT PRESSURE GAUGE UNITS.

* ** Chart Range Indicates Average Requirement. May Vary To Suit His Standard Charts As Required.

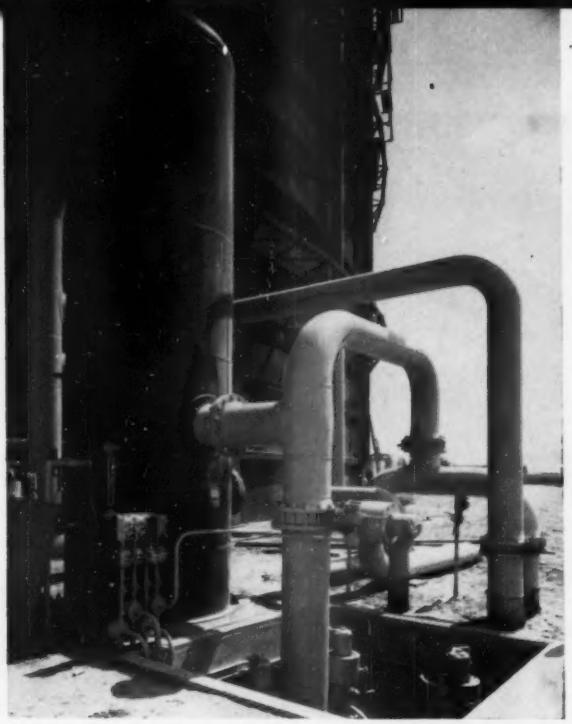
TRANSMITTER SCHEDULE

No	TYPE	SERVICE	SIGNAL TO
PT-1	PRESSURE TRANSMITTER	PLANT GAS DISCHARGE	PR-1
PT-2	" "	EXCESS GAS TO HOLDER	PRC-1
PT-3	" "	COMPRESSOR SUCTION	PR-2
PT-4	" "	COMPRESSOR FUEL GAS	PR-4
PT-5	" "	STARTING AIR	PR-3
TT-1	TEMPERATURE TRANSMITTER	GAS DISCHARGE FROM COOLERS	TR-2
TT-2	" "	OIL COOLER WATER SUPPLY	TRC-1
TT-3	" "	JACKET WATER SUPPLY	TRC-2
TT-4	" "	AMBIENT AIR	TR-1
DPT-1	DIFFERENTIAL PRESS. TRANSMITTER	COMPRESSOR SUCTION	PR-2
MT-1	VOLUME TRANSMITTER	GAS HOLDER VOLUME	VI-1, VR-1, SV-3

FOR TRANSMITTER RANGE, SEE RESPECTIVE RECORDER RANGE IN INSTRUMENT SCHEDULE ABOVE.

CONTROLLER SCHEDULE

No	TYPE	SERVICE	SIGNAL FROM	SIGNAL TO
PC-1	PRESSURE CONTROLLER	EXCESS GAS TO HOLDER	PRC-1	BPCV-1
TC-1	TEMPERATURE CONTROLLER	OIL COOLER WATER SUPPLY	TRC-1	TCV-5
TC-2	" "	JACKET WATER SUPPLY	TRC-2	TCV-6
GAC-1	GAS ANALYZER CONTROLLER	GAS ANALYSIS	GA-1	



Above: Fluor scrubber cleans gas, here entering compressor station complex. It may be routed either into Long Beach's distribution system or to Wiggins holder (background). In some cases, it goes directly to a nearby steam plant.

Clark lube oil cooler (supplied cooling water via two Risto-Brugger E2QS evaporative units, which also supply the engines' jacket water exchangers).

Mounted outside the station, and ringing the doughnut-shaped discharge header, are four oil bath filters (Air Maze). Outside, too, stand three starting air receivers, jacket water surge tank, lube oil cooler surge tank and six horizontally mounted storage bottles (typically, one stores lube oil, another wiping oil, a third drippings from engine sumps).

Fuel gas to the spark-ignited compressor engines (ignition is by Bosch MJA magnetos) routes through a Rockwell meter, thence to the compressors and to the standby electric set. Fuel gas is injected at a minimum 15 psig.

Jacket water is dropped 10 deg through the induced draft coolers, the inlet temperature about 160 deg F, the outlet 150 deg F. Lube oil temperature is dropped about 20 deg (from an entering 110 deg F to an operational 90 deg F).

The compressors have a maximum design output of 100 psig. The design criteria:

	Low Pressure Service	*High Pressure Service*
Suction pressure (minimum)	0 psig	18 psig
Suction temperature	30degF	75degF
Discharge pressure (minimum)	20 psig	70 psig
(maximum)	50 psig	100 psig

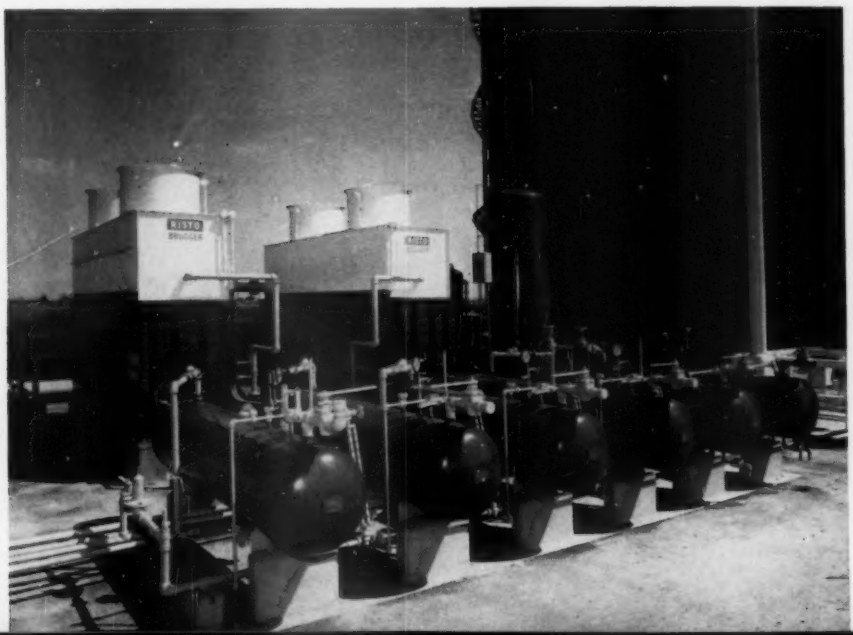
Hourly output varies, of course, with discharge pressure. At 20 psig discharge, 0 suction pressure, the four compressors have a combined hourly output of 1.5 MMcf. At 50 psig, O suction, output is rated 1 MMcf. At maximum 100 psig, 18-lb suction, capacity is about 1.3 MMcfh.

Station 6's 1+MMcfh output adds about 25 per cent to the capacity of Long Beach's existing 3-station system:

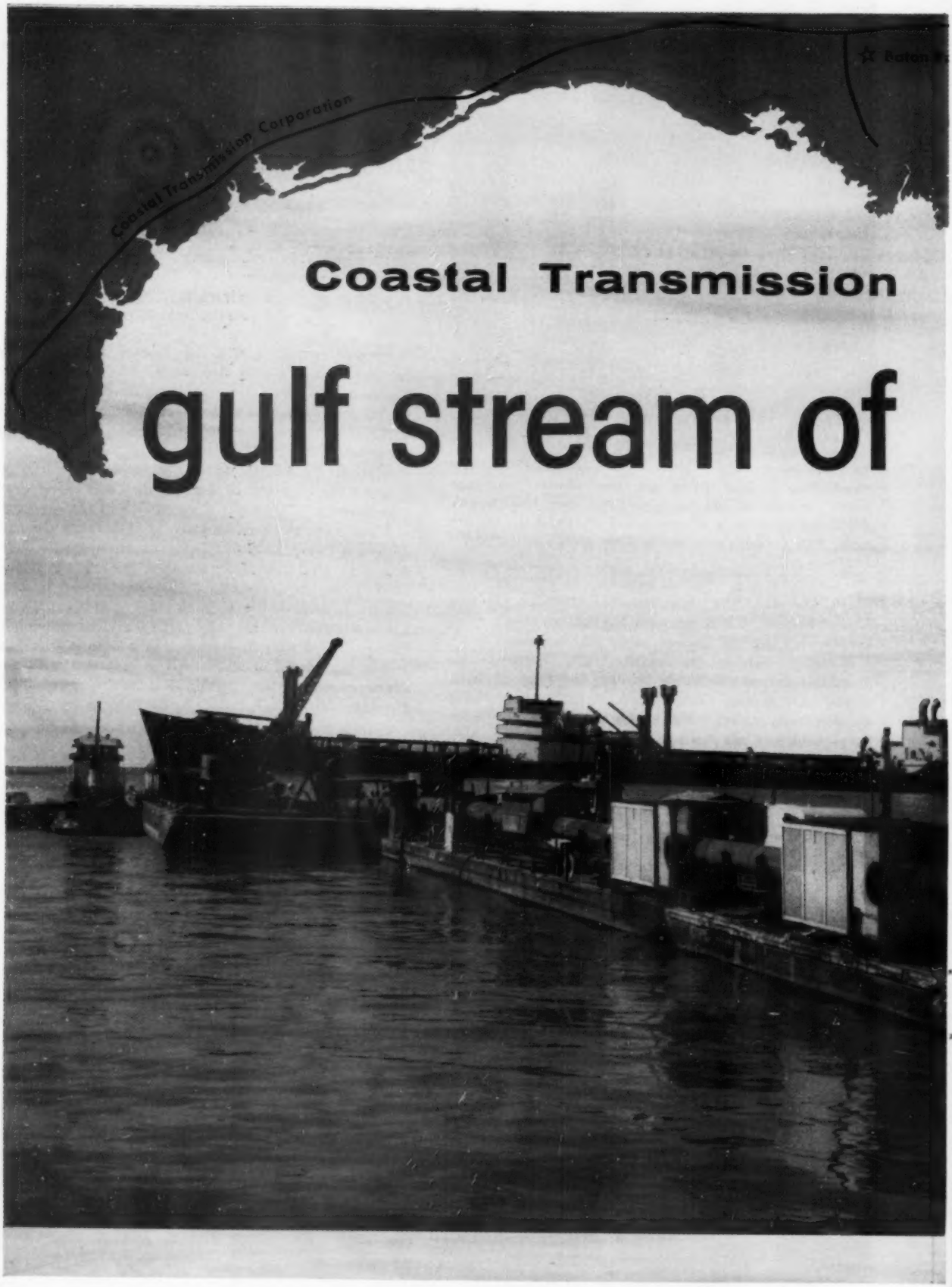
Plant 1, in the harbor area, is installed with three Ingersoll-Rand XVG-6 225-hp engines, their hourly capacity some 400 Mcf. Plant 4, near Long Beach's airport, has capacity of 2.5 MMcfh, boosted by three 550-hp HSRA-4 Clarks and two 400-hp HSRA-3s (this station became operative only in September 1956). Third system station, Plant 5 in North Long Beach, is rated 750 Mcfh, and is installed with four Clark engines (two 200-hp RA-2s and two 300-hp RA-3s).

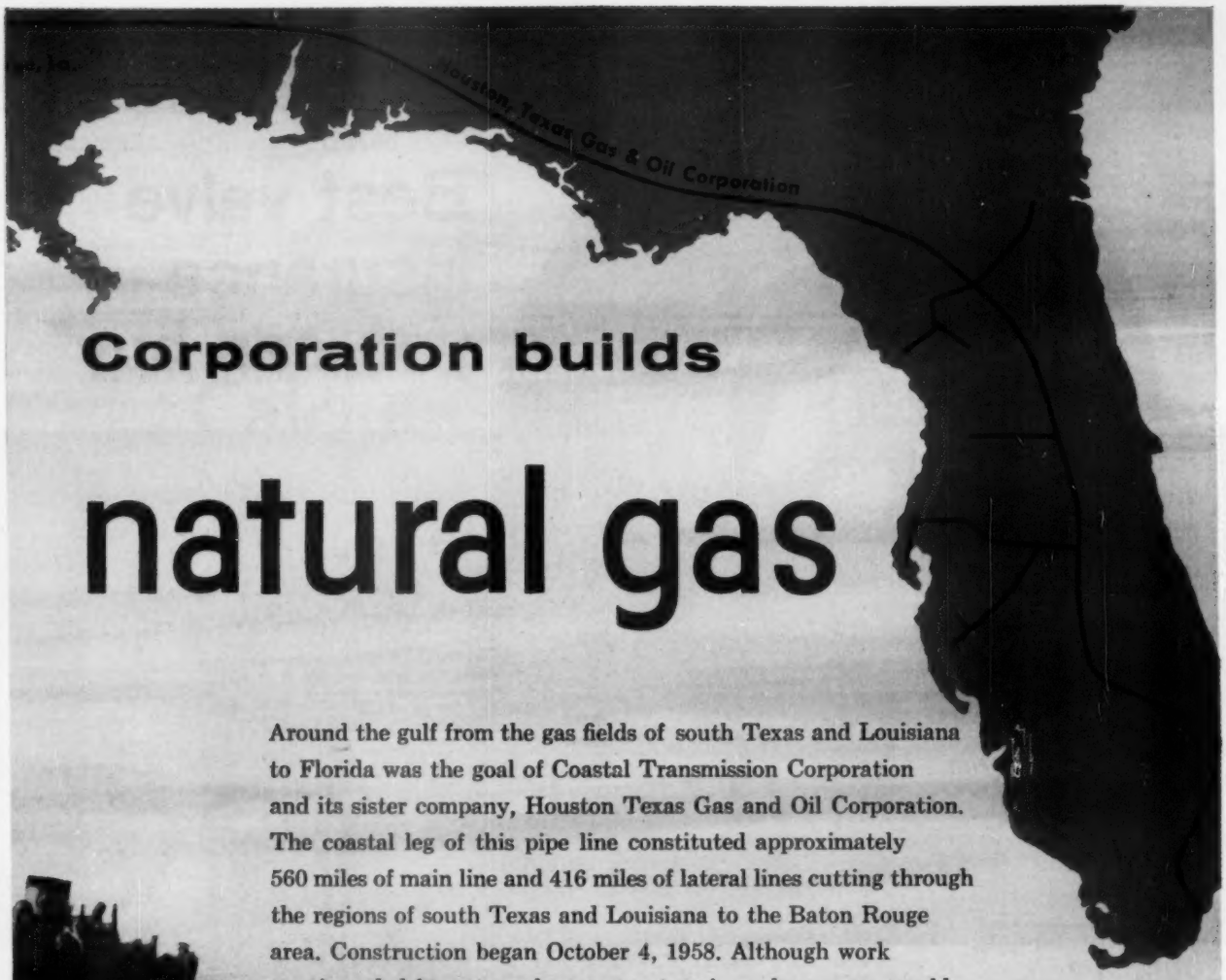
Compacted into Station 6 is a wheel-and-hub concept destined, believe many an engineer, to supplant traditional compressor plant design.

Key to that concept is the 10-ft diameter suction sphere, an engineering concept that makes dollars and sense for gas utilities the nation over. ■



Left: Compressor yard, showing holder, two evaporative coolers for compressor-engine lube oil and jacket water cooling, and six storage vessels for various lubricants.


Coastal Transmission Corporation
Coastal Transmission
gulf stream of



Corporation builds natural gas

Around the gulf from the gas fields of south Texas and Louisiana to Florida was the goal of Coastal Transmission Corporation and its sister company, Houston Texas Gas and Oil Corporation. The coastal leg of this pipe line constituted approximately 560 miles of main line and 416 miles of lateral lines cutting through the regions of south Texas and Louisiana to the Baton Rouge area. Construction began October 4, 1958. Although work was impeded by extremely swampy terrain and an unseasonably wet spring, the line was completed by June of 1959.

A. O. Smith furnished 167.5 miles of 24-inch pipe and 91 miles of 20-inch main line pipe that spans this coastal region.

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CROSSING THE BAY — Approximately 11 miles of 24-inch pipe was laid across Galveston Bay. Special techniques had to be employed in crossing the busy Houston Ship Channel. All of Coastal's river crossings were submerged.

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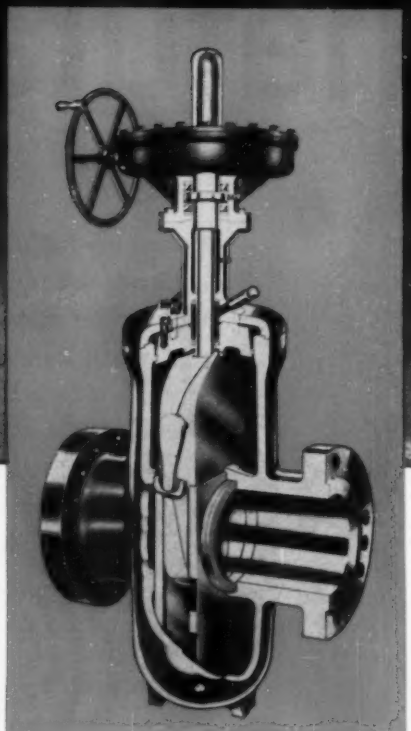

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5905-R

How Pacific Northwest uses

Calcium chloride dehydration

to process 100 billion cu ft daily

By E. R. MOORE and W. G. CUTLER, Pacific Northwest Pipeline Corp.

WATER vapor in natural gas is always a major operating problem in field gathering and transmission systems. In cold-weather operations, the freezing problem of water vapor present in natural gas is so critical that individual wellhead dehydration is needed. Pacific Northwest Pipeline Corp. has used calcium chloride in individual wellhead dehydration units to process over 100 billion cu ft of natural gas. Because of the sub-zero and freezing weather conditions in the Rocky mountains, water in liquid and vapor form is removed at the individual well site before entering the gathering system. This insures a continuous gas supply throughout the year.

Production areas are in the Big Piney field, Wyoming, Piceance Creek field in northern Colorado, and the Bar-X field on the Colorado-Utah border. These fields offer a wide variance in the natural properties of produced gas. In Big Piney shut-in pressures range from 200 to 3000 psi. Wells have low average producing temperatures, distillate production from very small amounts up to 30 bbl per MMcf of gas, and flow rates from 0.1 to 6.0 MMcfd. In Piceance Creek, wells have shut-in pressures of 700 to 800 psi, high flowing temperatures, and generally small amounts of distillate and free water. The Bar-X field has shut-in pressures of 600 to 1200 psi intermediate flowing temperatures, and free water and distillate. All kinds and types of dehydration equipment are employed in removing water from gas in these areas. However, we have used calcium chloride almost exclusively in our operations.

• Principles of dehydration

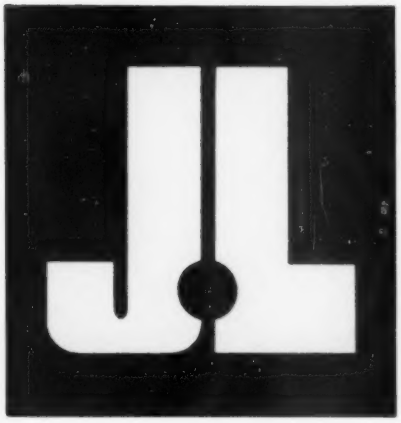
Calcium chloride, either as a solid or in solution, has been used as a drying agent in the natural gas industry for many years. Solid calcium chloride salt crystals were first used in desiccant pots to remove water from wet gas. Here dehydration was achieved by the contact of the water and salt to form a brine. In other cases, brine was put into the pipeline where the turbulent gas, further mixed with the brine, gave a reasonable dew point depression. The brine ultimately was gathered at a central point and disposed of.

In 1955 experimentation began with calcium chloride as a desiccant. A dehydration unit was developed that contained a desiccant pot, or calcium chloride bed, and used brine in a series of trays. In this application the wet gas from the well first enters at the base of the unit into an integral-separator section. Here free liquids, water and hydrocarbons, are extracted before the gas passes upward into the tray section. Gas flows through a series of trays where it comes in contact with brine in various degrees of salt concentration. The brine concentration increases from the bottom tray progressively upward through the five tray levels normally employed. The spent brine from the bottom tray falling into the integral-separator section is dumped into a pit for disposal. The gas, while in contact with the brine, passing through the trays has a large percentage of the water removed. From this stage, the partially dehydrated gas flows into the calcium

Superior quality 12¾" O.D. J&L Electricweld line pipe was used for 17 miles of this Northern Oklahoma Gas Company line from Cherokee to Ponca City. The line will serve the towns of Ponca City, Perry and Newkirk, Oklahoma, and area industries. J&L line pipe is available in sizes from 6⅝" to 12¾".

General Contractor:
O. R. Burden Construction Corporation, Tulsa, Oklahoma
Contractor for coating and wrapping:
Secrest Pipe Coating Service, Tulsa, Oklahoma

Pipe laying operations with this J&L Electricweld line pipe are fast and efficient. Weldability is excellent. Pipe is 29.28 pounds per foot, .219" wall, X-46 grade.



Reliable field performance is assured because every length of J&L pipe undergoes a specified hydrostatic pressure test which proves its dependability under sustained and surge pressures.

This ultrasonic tester provides immediate pictures of weld soundness in all J&L Electricweld line pipe. It is one of the most advanced control devices in pipe-making.

Quality control at J&L pays off on a job at Cherokee

Every length of J&L line pipe passes over 50 quality tests before it enters the field

Total quality control of J&L Electricweld line pipe is maintained through more than 50 control measures and tests on every length of pipe.

Crush tests assure weld strength and steel quality. A modern ultrasonic device probes soundness of the weld. All joint ends are magnafluxed to assure freedom from flaws. Every length is full-pressure tested under specified A.P.I. or A.S.T.M. hydrostatic test requirements, both in time and degree of pressure. These are a few of the stringent controls that assure complete dependability of J&L Electricweld line pipe.

It pays to specify plant-tested, field-proved J&L Electricweld pipe for your transmission, distribution or gathering lines. Write for J&L's new bulletin.

Jones & Laughlin Steel Corporation

PITTSBURGH, PENNSYLVANIA

chloride bed where the remaining water is absorbed by the calcium chloride pellets. The physical state of the calcium chloride varies in the bed section in that the lower 2 ft of the bed is very moist and the top of the bed is generally dry. The formation of brine in the base of the bed section furnishes a continuous source of brine for the trays. The gas leaving the bed section passes from the top of the unit into the measurement facilities and on into the gathering system.

In operation, as the gas continues to pass through the unit the chemical bed depletes itself. Dehydration, as measured by dew point depression, remains at a maximum until the calcium chloride in the bed section is about 75 per cent depleted. At this point, it is necessary to "recharge" the unit. In our operation, we use loaders on the individual units which hoist the barrels of chemical to an opening in the top of the unit and allow the calcium chloride pellets to gravitate into the bed section. The recharge normally requires 2 to 3 bbl of chemical, depending on the original capacity of the chemical bed and the percentage of chemical depletion. The frequency of recharging depends on the flowing pressure, flowing temperature, and volume. For example, a producing well flowing at 3.5 MMcfd at a temperature of 50 deg is recharged monthly. But a well producing from a similar formation at 100 Mcfd would require recharging every six months. Since each well has its own producing characteristics, recharging must be set up on an individual well basis. Some wells require recharging as often as every three weeks. Others are recharged after periods of from three to six months. Therefore, our scheduling is determined from field experience and knowledge of the condition of the bed at last recharge.

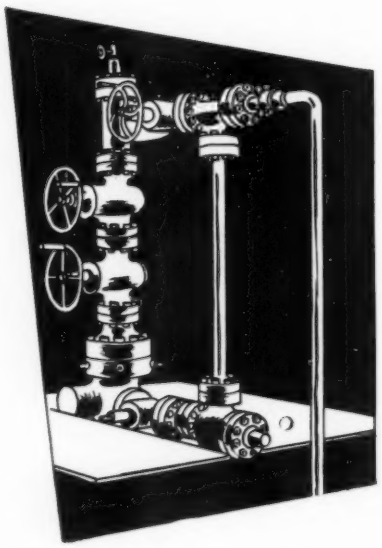
• Chemical

Operating and testing experience with various sized anhydrous calcium chloride pellets has established a standard pellet size that achieved minimum consumption and highest efficiency. Specifications currently in use are 1-in. maximum and ½-in. minimum individual pellets, allowing only 1 per cent of sizes below ¼-in. The calcium chloride is furnished in 350-lb drums. It is important that it be handled as carefully as possible to prevent damage to the barrel to insure that the chemical is not exposed to the atmosphere.

• Unit sizing procedure

In Pacific's areas of operation the conventional multi-point back pressure test is not used in sizing our equipment. It is difficult or impossible to achieve stabilized flow within a reasonable limit of time. Therefore, we employ a flow test for each well using a restricted flow through a choke to atmosphere long enough to offset high initial production flow rates following a shut-in period. We also compare offset production data in determining estimated producing rates at the gathering system pressures.

The unit is then sized one-third larger to handle the initial high flow rate and provide capacity for

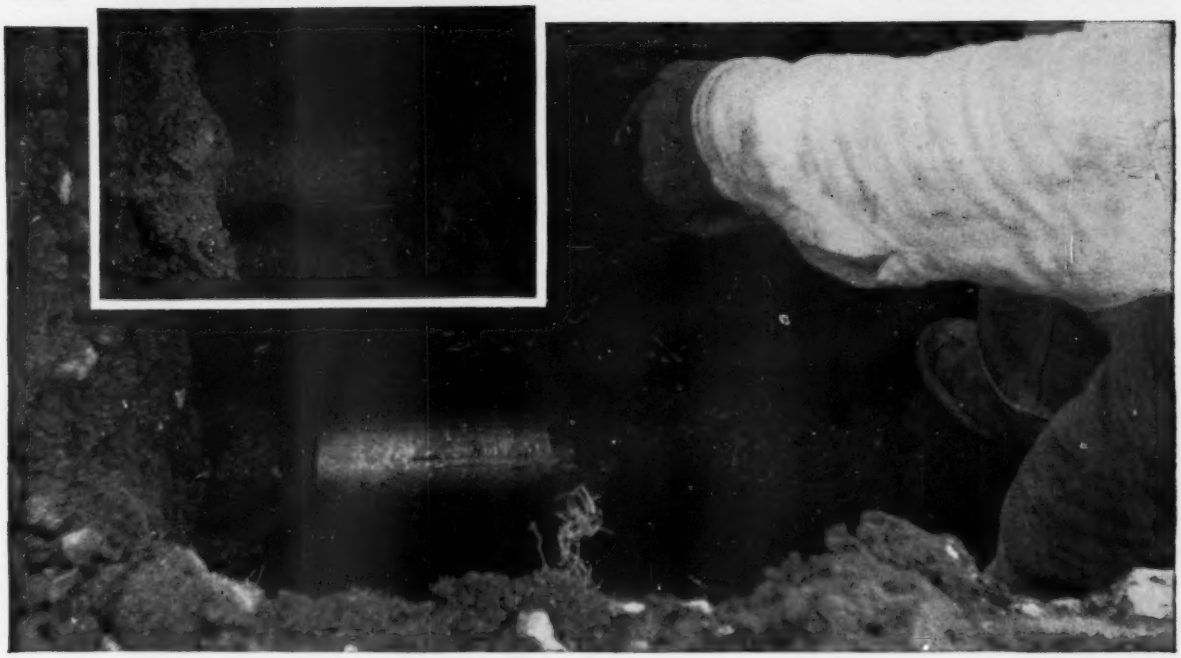


depletion of the well into lower gathering system pressures. It is important that flow rates be kept in the upper one-third of the range of the unit to insure proper mixing of the brine and gas within the unit. The unit manufacturer offers models which are rated at various volumes at different pressures. We select a particular unit that will meet our requirements.

• Problem due to improper sizing

In normal operation, as the chemical is consumed the bed falls uniformly. However, when a unit is operated at less than ⅔ of rated capacity, the gas fails to adequately mix with the brine in the tray section and the majority of dehydration is accomplished in the chemical bed. Under this condition, the entire chemical bed becomes moist and the individual calcium chloride pellets are bonded together to form a solid bridge within the unit. The bridge formed adheres to the sides of the vessel and the chemical is consumed from the bottom up. This forms a cavity between the tray section and the suspended calcium chloride bridge. When this condition is found, we attempt to drop the bridge by pouring water around the outer edge of the bed and down the side of the vessel. The bridge then falls to the bottom of the bed section and the calcium chloride bed is replenished. Channeling of the bed may result when a bridge is formed. In this case, the gas seeks the path of least resistance through the bed and consumes the calcium chloride in this path. This condition is handled in the same manner as bridging by pouring water around the vessel walls and dropping the calcium chloride to the bottom of the bed before replenishing the supply of chemical. Bridging conditions will have very little effect on dew point depression since the effect of the chemical bed is not altered. When channeling occurs, the dew point depression and amount of dehydration performed becomes progressively less as the brine becomes water saturated. Under our recharging schedule, this is

17-YEAR PROTECTION RECORD!



Year After Year...More Evidence Proving That TAPECOAT® Adds Years of Service Life to Gas Lines Underground or Under Water

Right across the country, TAPECOAT installations prove that you get more for your money when you measure pipe protection with a calendar.

Since this cost-cutting coal tar coating in tape form was first introduced in 1941, it has demonstrated its ability to withstand severe conditions underground or under water. TAPECOATED lines dug up after 17 years of service show no signs of deterioration on the pipe.

Typical is the experience of a utility in a coastal area. For a thorough trial, this company applied TAPECOAT in areas where severe corrosive conditions were known to exist. The lines were dug up this year and, after years of service under severe conditions such as brackish waters and corrosive soil, the pipe showed no signs of corrosion, proving the quality of TAPECOAT protection.

In terms of preventive maintenance and replacement costs, performances like this emphasize the most important consideration in buying protection. Remember, TAPECOAT is a hot-applied coal tar coating in tape form—designed for lasting protection on pipe, pipe joints, service connections, mechanical couplings, fittings, insulated lines, tanks, tie rods, and other steel surfaces vulnerable to corrosion.

TAPECOAT comes in rolls of various widths and is available in asphalt. Where primer is desired, specify TC Primecoat, the compatible coal tar primer.

A TAPECOAT sales and service engineer is always available to help you on any corrosion problem. Write for complete details today!

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TABLE 1. 1958 DEHYDRATION UNIT COST—NORTHERN DIVISION OPERATIONS

Field	No. Units	Avg. Daily Production MMcf	No. of Operating Personnel	Operating Cost[1] $/MMcf	Maintenance Cost[2] $/MMcf	Total Oper. & Maint. $/MMcf	Chemical Cost $/MMcf Prod.	Chemical Consumption #/MMcf
Big Piney	108	110.0	13	1.83	0.67	2.50	.646	7.65
Bar-X	9	8.0	2	6.00	0.27	6.27	1.180	17.60
Piceance Creek	14	18.0	2	3.80	0.75	4.55	1.060	15.75
Average	131	136.0	17	2.34	0.66	3.00	.730	9.31

[1] Includes: Field Supervision, Chart Changing on Field Meters, Routine Unit Inspection, Recharging (including chemicals), Transportation.

[2] Includes: Field Supervision, Repair Parts, Location Up-keep, Painting, Transportation.

usually detected and remedied by the time effective dehydration ceases.

When units are operated above the rated capacity, the speed of the gas through the tray section prevents the brine from falling normally to the separator section. The brine is carried into the bed section and remains suspended above the trays until the rate of gas flow is reduced. Units may be operated under this condition with adequate dew point depression if the flow is reduced for a sufficient time each day to permit the brine to gravitate into the tray section and the excess brine removed. While adequate dehydration is accomplished, operating above capacity is not economical because of the higher rate of chemical consumption.

• Cost of dehydration

Pacific's cost of dehydration in 1958 has been determined by individual fields. These costs consist of operating, maintenance, and chemical expenses computed on each MMcf of volume handled. *Table I* lists these costs. The expenses accumulated under "Operating Costs" include field supervision, chart changing in field meters, routine unit inspection, recharging (including chemicals), and transportation expenses. Similarly, "Maintenance" expenses include field supervision, repair parts, location up-keep, painting and transportation expenses. The factors that account for the high difference in costs between fields is directly related to the size and scope of operation and the particular field dehydration problem. The Bar-X operation requires two men and has only nine wells from which relatively small produced volumes are taken, which will account for the above-average cost. This same condition is also reflected in the Piceance Creek field. Our weighted average cost for dehydration of $3 per MMcf, or .3 cents per Mcf will compare favorably with similar types of dehydration operations used in the Rocky Mountain area.

The cost data presented in the accompanying table is from our company's accounting and measurement records. These costs represent Pacific's expenses in the areas under discussion. But they will not necessarily be applicable to other areas or permit comparisons with other types of equipment. They are related to particular well producing characteristics, composition, and physical properties of natural gas and the geographical location of operations common to the three areas of Pacific's gathering. ■

This article is adapted from a paper presented at the PCGA Transmission Conference held in Palm Springs, Calif., April 29-30, 1959.

Pipeline crews uncover the past

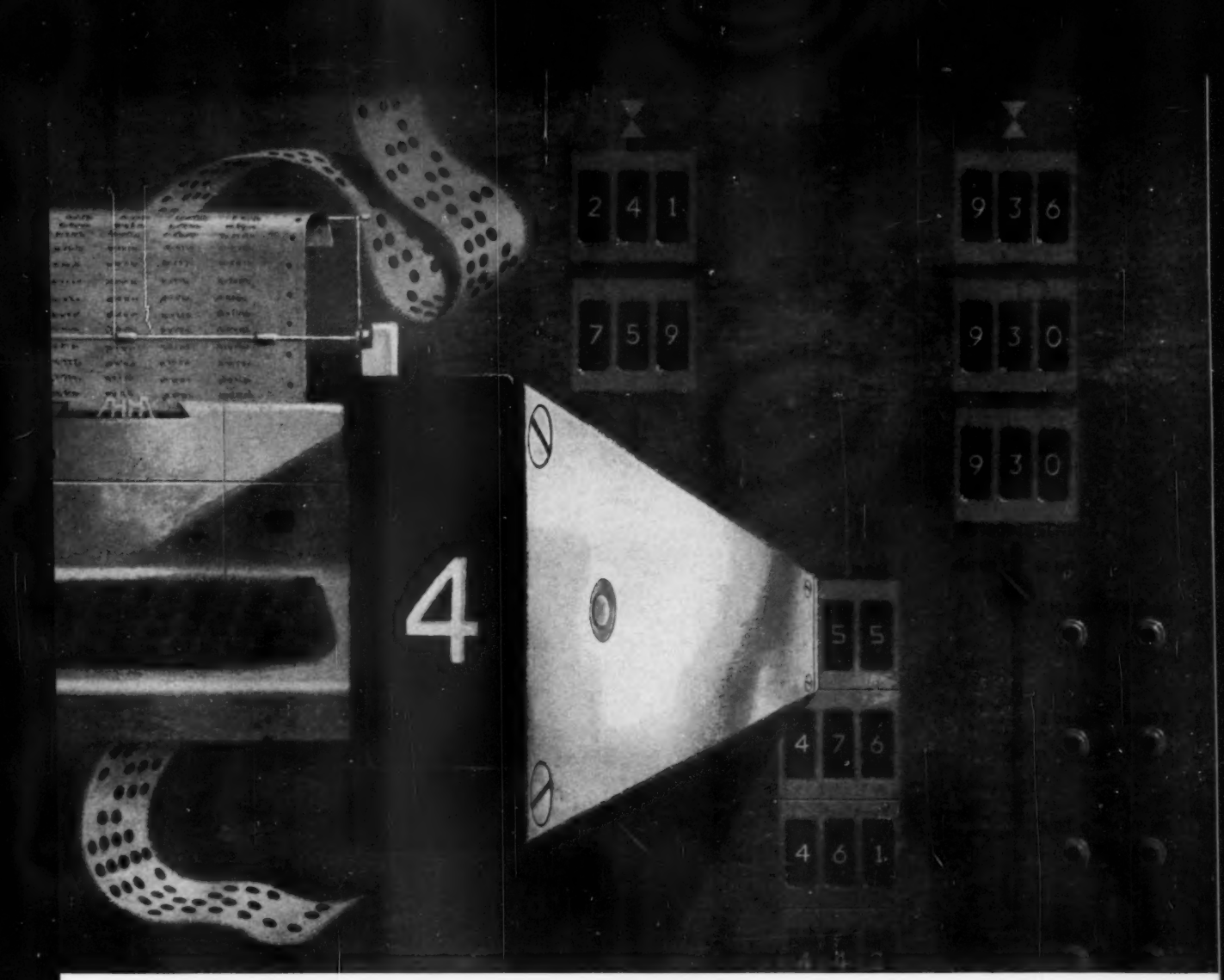
Yesterday, today, and tomorrow met in the main street of Temecula, Calif. recently when pipeline construction crews uncovered an old Indian steam bath built of rocks. The Southern California Gas Co. crew was digging for a new gas main bringing natural gas to Temecula for the first time.

The 150-year-old town is located south of Riverside on the inland route to San Diego. It had its beginnings as a trading post for trappers coming up from the Colorado river. Before that, however, it was part of the vast lands roamed by the Luiseno and Temecula Indians.

The steam bath — called a Temescal by the Indians— could be a remnant of the older Luiseno civilization. Or, it could be of more recent construction by the Temecula Indians who lived in the area before the town was started.

About all that remains today of the town's Indian background is the name. Temecula changed from trading post to Butterfield stage stop to railroad way station. Then, around 1900, heavy rains and floods washed out the railroad trestles leading to the town. The trestles never were rebuilt, and Temecula's progress slowed to a halt.

Now, with the arrival of natural gas, the quiet community is beginning to stir again.



NEW CONTROL CONCEPT can cut your pipeline costs

Did you ever try to solve a jigsaw puzzle without first looking at the total picture the puzzle makes? Pretty difficult—maybe even impossible. Best way, easiest way is to look at the big picture first, then see where the individual pieces fit.

It's the same with pipeline control.

First, look at your total system problem. Then, determine what sort of control system is required to safely, reliably and economically meet tomorrow's need as well as today's. That is Union Switch & Signal's approach to pipeline control.

Any part of a pipeline system. Union Switch & Signal can incorporate in a centralized control system any or all of the following functions: supervisory or remote control of satellite stations . . . telemetering of flow data from field back to your central dispatching office . . . automatic sequencing or control of equipment in the field . . . instrumentation . . . data handling and display . . . computing equipment . . . automatic integration of field data into your accounting operations . . . communications. Union Centralized Transport Control can be adapted to *any* problem from remote control of a single-unit booster station for gas or oil to automatic centralized control of an entire system from wellhead to ultimate consumer.

Error-free. Whatever the job assigned to it, Union Centralized Control operates completely free from error because it reduces to coded digital form all information and instructions transmitted to or from your central control office. As a result, you can transmit far more precise data than ever before; you can use the least expensive available communications service; and you never need to worry about lightning, noise or other interference causing a wrong or dangerous operation—this coded system automatically checks itself and responds *only* to correct and logical signals. It helps make your pipeline safer. It provides error-free *security* as well as reliability.

Lower operating cost. Most important, Union Centralized Transport Control cuts your operating costs, cuts the cost of future expansion, sometimes even cuts present installation cost of pumping stations.

Write for Bulletins PD 2006, PD 2007 and 1052

"Pioneers in Push-Button Science"

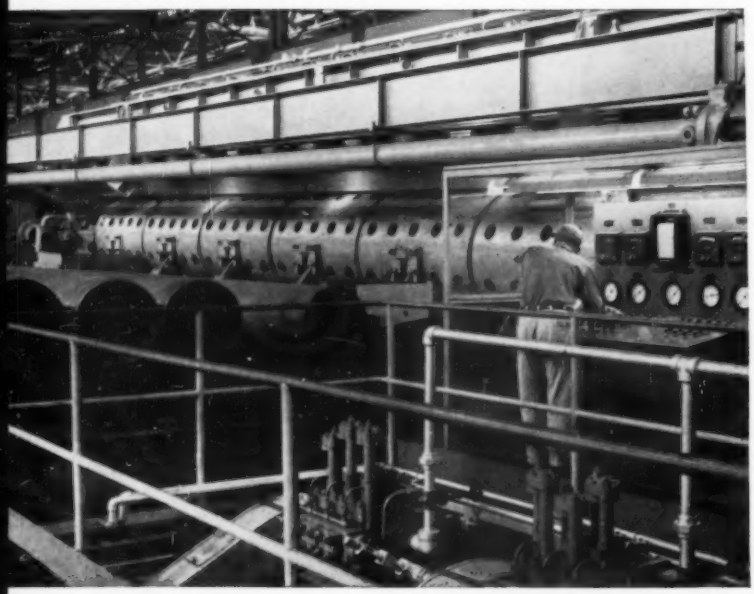
UNION SWITCH & SIGNAL
DIVISION OF WESTINGHOUSE AIR BRAKE COMPANY
PITTSBURGH 18, PENNSYLVANIA

Industries near Hot Springs have a new and greater source of natural gas to rely on with the completion last fall of Arkansas Louisiana Gas Company's newest addition to their extensive pipeline system.

Almost a hundred miles long, the new 16-in. line starts from Aetna Field in western Arkansas and runs almost straight-a-way southeast over Magazine Mountain to terminate at Ark-La's mainline junction near Jones Mills in central Arkansas. The Bethlehem electric resistance-weld pipe used in the line met the .250-in. wall, API 5LX, Grade X-46 specification in every length, and successfully passed the hydrostatic test of 1,000 psi, full operation pressure.

On the highest peak in Arkansas or under the streets of St. Petersburg

You can count on Bethlehem line pipe



Each length is up to specs
True to round and bevel
Passed "OK" by our thorough inspection staff

For top-quality line pipe, call or write:

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

Export Distributor: Bethlehem Steel Export Corporation

LINE PIPE TO 42-IN. OD. At Steelton, Pa., we produce hydraulically-expanded electric-fusion-weld API pipe from 18-in. to 42-in. OD in 40-ft lengths with walls to ¾-in. in all diameters. Electric resistance-weld pipe from 5⅝-in.to 16-in. OD in lengths to 60 ft, and Beth-Co-Weld continuous buttweld pipe from ½-in. nominal to 4½-in. OD are produced to standard API line pipe specifications on our modern pipe mills at Sparrows Point, Md.

The City of St. Petersburg added to their natural gas distribution system last summer with the installation of a new 12-in. line. Laid in sandy soil along tree-shaded streets, the line went in quickly and tested out perfectly, all due to three factors: sound planning by Stone & Webster Service Corporation, New York, N. Y.; expert pipe-laying practices of Aldridge-Poage, Inc., Lexington, Ky. (now operating under the name, Poage Construction Company, Inc.); and the uniform high quality of Bethlehem electric resistance-weld steel pipe. Industrial Supply Corp., Tampa, Fla., was the pipe jobber.

BETHLEHEM STEEL

BETHLEHEM STEEL

Edited by FRANK CHAPMAN

Analog or digital telemetering?

By F. VINTON LONG

I AM sure that gas company management often wonders just what is the difference between digital and analog techniques of transmitting intelligence.

And I am sure they wonder which they should use and if one is the better of the two. In fact, we in the tele-control business have to look long and hard on occasion to decide which type should be used on a job.

To understand it better, maybe we should in simple language explain how each type works.

First the analog, of which the slide rule is an example. Analog data transmission picks up intelligence as a continuously varying quantity and delivers it the same way. An example of this is a pressure transducer which transmits its information by means of varying the time ratio between conditions of signal "on" and signal "off."

Digital techniques use "yes" and "no" or "go" and "no-go" bits of information, which is counted on some form of electric counting relay chain and the intelligence finally winds up as a display of numbers on a scoreboard or electric typewritten paper.

Analog type telemetering lends itself for easy transmission on very inefficient communications circuits

GLOSSARY OF TERMS

In recent years, the fields of communications, information theory, and computer engineering have expanded until, in some applications, they have become one. The language of this rather new area of research draws on all three specialties for its vocabulary and sometimes puts a new interpretation on an old word. Some of the terms often encountered are listed below with their specialized meanings.

BINARY—Anything that is composed of two parts or elements, or which has only two states or conditions; for example, a switch may be either on or off.

BINARY CODE—Any *code* employing only two distinguishable *code elements* or states; mark-space and on-off are examples of *binary codes.*

BINARY DIGIT—A unit of information content; one element or *bit* of a binary or two-element code; mark and space are examples of *binary digits* used in communications codes.

BIT—Commonly used short form of *bi*nary digi*t;* see above.

CHANNEL CAPACITY — The maximum possible information rate through a channel. *Channel capacity* is often stated as the maximum number of *bits* per second that may be transmitted through the channel.

CLOCK—The primary source of synchronizing signals for a computer data system or data transmission system. In high-speed systems, the *clock* may be an oscillator, the output of which is used as a reference or timing frequency by the system.

CODE—A system for representing that which is to be transmitted. For example, Morse *code* may be used to represent letters in telegraphy. Words and language may be considered a way of *coding* ideas.

CODE CHARACTER—One of the elements which make up a *code* and which represents a specific symbol or value to be encoded. Dot-dot-dot-dash is the Morse *code character* for the letter *v.*

CODE ELEMENT—One of a set of parts of which *code characters* may be composed. Mark or space, dash or dot, are examples of *code elements.*

COMPUTER—A machine for carrying out calculations, or for performing specified changes or transformations of *information.* Some types of decoders operate on *computer* principles.

DATA—Information, usually originating as numbers, values, or digital symbols. *Data* usually excludes speech, music, or other continuous-wave information, even when converted to digital form for transmission.

ENTROPY—Disorder; reduction from an easily distinguishable condition to a less easily distinguishable condition; equal and opposite to "amount of information." An example of entropy is the gradual distortion and loss of a signal pulse as it travels down a long wire or cable.

ERROR—A false transformation of *information;* a mistake in transmission; improper alteration of *information;* an incorrect step, process, or result in transmitting *information.*

INFORMATION—News, intelligence; that which improves or adds to a representation. *Information* is an unpredictable event or item. If the transmission specifies something already known to the receiver, it is not *information.*

REDUNDANCY — Added or repeated *information* employed to reduce ambiguity or *error* in a transmission of *information.* As signal-to-noise ratio decreases, *redundancy* may be employed to prevent an increase in transmission *error.*

QUANTIZE—To convert a continuous variable, such as a waveform, into a series of levels or steps. There are no "in between" values in such a *quantized* waveform. All values of signal are represented by the nearest standard value.

(Courtesy Lenkurt Electric Company)

and if frequency-shift type carrier signal is employed, there is very little that can go wrong with the transmission for any practical distance.

Use of digital telemetering means that you must have quite an array of equipment, both at the transmitting end and at the receiving end.

You must have something to convert basically analog values into digital values through some sort of mechanism such as possibly a slide wire, and all this becomes a little complicated. However, it does have one big advantage that once it is coded into digital form it is error free from the transmitter to the receiver, because either the correct number comes in or it does not come in at all.

Another advantage, and in some cases quite an important one, is that a good many telemetered functions can be transmitted over one communication channel.

Many times, though, analog transmission should be used in order to standardize equipment that has been previously installed and to make use of a simple transmission link between the monitored equipment and the receiving point, and to read out the intelligence on a 31-day chart, for instance, which will give you a very secure record of what is going on. ■

Automation guide issued

The API has published a bulletin on "A Classification of Communications Circuits for Use in Automation in the Oil Industry." It is intended as a guide in setting up circuits, obtaining circuits from common carriers, and specifying circuit needs to equipment manufacturers. Copies are available for 50 cents each from the Publications Section, API, 1271 Avenue of the Americas, New York 20.

RCA building new plant

RCA industrial electronic products will be produced at a new plant in the Washington-Canonsburg, Pa. area. Plans call for the immediate construction of a 50,000-sq ft administration and engineering building. Future plans involve a manufacturing center with 130,000 sq ft of floor space.

This is an invitation to all oil men, gas men, contractors and utility men to visit our plant in St. Louis at any time. We will be happy to let you look under our roof . . . to conduct you on a tour of our plant to show you our operations.

Our Standard Procedures establish the highest standards of quality for coated and wrapped pipe. See for yourself that every claim we make is a fact.

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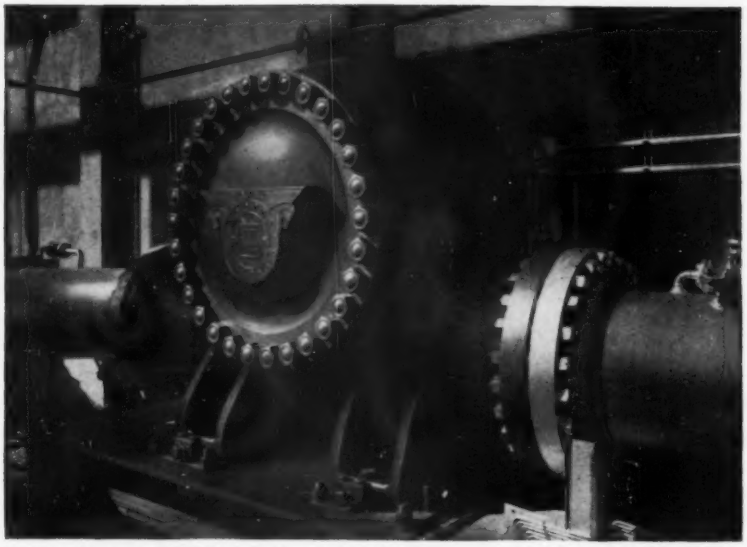

Cooper-Bessemer RFB-24 centrifugals, like this one, powered by Cooper-Bessemer LSV turbocharged gas engines, comprise the world's most efficient pipeline compressor units.

David M. Salls, *Manager, Gas Industry Sales, The Cooper-Bessemer Corporation, explains...*

How 5 Cooper-Bessemer powered, Gulf Interstate engineered stations will give Transwestern peak economy and flexibility

ALL FIVE of the mainline compressor stations of the new Transwestern Pipeline system will be equipped with Cooper-Bessemer engine-driven centrifugal compressors and will be remotely operated. These new automatic, remote-controlled stations will provide unexcelled efficiency and flexibility... a fact proven by the highly successful performance record of this modern equipment in other mainline stations of the same basic design – over 130,000 horsepower to date in mainline service.

The giant Cooper-Bessemer LSV-16 turbocharged gas engines will be of the type shown here. They will drive Cooper-Bessemer RFB-24 centrifugal boosters through speed increasers. Each of the five stations will include two of these high-efficiency compressor units. These units have the highest thermal efficiency obtainable in the gas industry today. The map shows the location of the stations. All units will be automatically controlled from a central point.

We will gladly supply details on this Cooper-

Map shows location of Transwestern's mainline automatic, remote-controlled stations. Background shows type of Cooper-Bessemer LSV-16 turbocharged engines to be used on this new line.

Bessemer equipment, and assist in *your* compressor station plans.

BRANCH OFFICES: Grove City • New York • Washington Gloucester • Pittsburgh • Chicago • Minneapolis • St. Louis • Kansas City • Tulsa • New Orleans • Shreveport • Houston • Greggton Dallas • Odessa • Pampa • Casper • Seattle • San Francisco • Los Angeles

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GAS • PIPELINE NEWS

Wrapping up Canadian exports

WILL 1960 be "the year" of history in relation to "go-aheads" for the several projects awaiting approvals to bring additional Canadian-produced gas across the border into the United States? Many gas industry key figures think it will be. The feeling is equally strong, at the moment, on both sides of the International Boundary.

Canada's National Energy Board meets in Ottawa on the 5th of January to hear applications for new natural gas exports. All export projects will be heard in continuous fashion during the session. It is expected to move smoothly, with a possibility that all will have Canadian okay well within two months.

The largest proposal orbits around Pacific Gas & Electric (San Francisco). Its Pacific Gas Transmission Co. affiliate wants to take 456 MMcfd at the Canadian border for delivery of 415 MMcfd to PG&E at the Oregon - California border. Gas supply will be in western Alberta from Alberta & Southern Gas Co., through a Canadian line to be built to the U. S. border by Alberta Natural Gas Co. Ltd. and Alberta Trunkline.

The Alberta Natural pipeline will also deliver 150 MMcfd to Pacific Gas Transmission from Westcoast Transmission for the account of Pacific Northwest Pipeline - El Paso Natural. PGT will deliver the gas to points in Washington and Oregon, under contract with PNW-El Paso.

Pacific Northwest Pipeline Corp. or the Pacific Northwest Division of El Paso Natural, whichever it is at this writing, will put a matching and offsetting 150 MMcfd into El Paso's Rock Springs or Thistle project—which will take 470 MMcfd to southern California, 235 from PNW (includes the trade-out 150 MMcfd from Westcoast) and the other 235 MMcfd from Colorado Interstate Gas.

Both the PG&E and El Paso centered plans need Canadian and FPC authorization. A Montana Power Co. project to bring 36 MMcfd across the border from its affiliate Canadian-Montana Pipe Line Co. is in essentially the same situation.

And, of course, there is the 204 MMcfd of Canadian gas that Trans-Canada Pipe Lines wishes to export to Midwestern Gas Transmission. This one has been on the books a long time, but looks as if it is coming to a head.

Trans-Canada also wants to export any surplus (to that for Canadian consumers and Midwestern) gas not exceeding another 204 MMcfd at Niagara. Too, there is a small export of 16.5 MMcfd, a Consumers Gas - sponsored project to send Canadian gas into New York state.

If all of these plans receive all of the authorizations for all of the volume for export desired, over 1 billion cu ft per day of Canadian gas will be involved and can flow across the border as quickly as facilities can be placed in operation.

There has been speculation that the Canadian board will rule on the natural gas export cases simultaneously. This points toward blanket approval, but may not mean approval of the maximum initial volumes asked for, in certain cases, some experts say.

However, nearly all interested parties and officials are confident as one can be in the gas business, that this year is the big one for launching new projects to bring Canadian gas to the U. S.

PG&E surveys new route

At year's end, a seven-man crew was expected to have completed a master control survey for a 300-mile leg of PG&E's proposed new $338-million, 1400-mile natural gas pipeline that will move Canadian gas into the San Francisco area. The large-diam. transmission project is scheduled for completion and operation by Nov. 1961. Pacific Gas & Electric will own and operate that part of the line from the Oregon border to San Francisco Bay. Affiliated Pacific Gas Transmission Co. will own and operate the line from the Canadian border in Idaho, down through Washington and Oregon to the California state line. Initially, 415 MMcfd will be brought into California.

A relatively new surveying technique, Tellurometer (see GAS, July 1959, pp. 118-121), which uses radar - like electronic waves, is speeding the job. Savings of about 40 per cent over conventional methods are estimated for the new surveying instrument.

Yard tapewrap shown

More than a dozen demonstrations of pipeyard application of tape are scheduled around the country to show that such application is just as practical, easy, and economical as the over - the - trench method. Polyken Sales Div., Kendall Co., is sponsor.

Scene of the first demonstration was Southern California Gas Co.'s pipe coating and wrapping yard, in December. A Betzel CW-412 Tapester machine was stationary mounted. It cleaned the pipe and spun on a Polyken tape wrap, with an outerwrap over it. This machine handles pipe from 3-in. ND thru 12-in. ND, and tape up to 10 in. wide.

During the event, 4-in. pipe was used. Joints of 42-ft pipe were cleaned, taped and outerwrapped in from 62-64 seconds per joint.

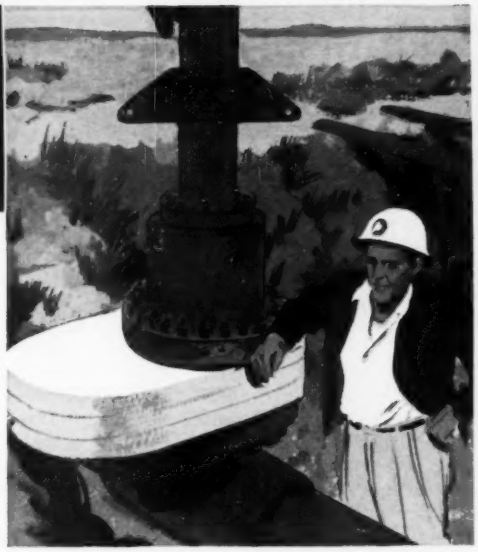
Polyken rep Don McCabe estimated that the stationary setup would cost about $2000 in addition to the $3750 Tapester. A new Betzel machine, to be available shortly, will handle 0.75-in. thru 4-in. pipe.

Peoples Gas reorganization

Federal Power Commission has authorized Peoples Gulf Coast Natural Gas Pipeline, a wholly owned subsidiary of the Peoples Gas Light & Coke Co. (Chicago) to carry on operations and business of Texas Illinois Natural Gas Pipeline Co. TINGP Co. will be liquidated as part of the reorganization plan. The move became effective about Dec. 15, 1959.

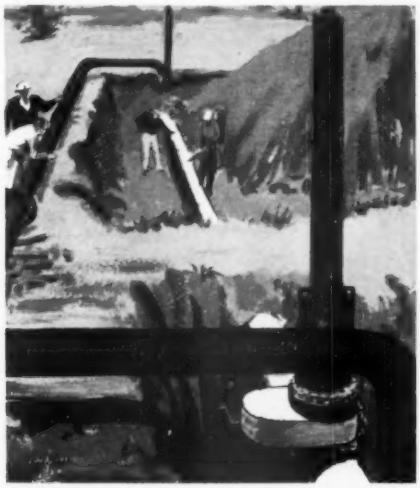
NEWS FROM DOWN THE LINE!

WmSON STOPPLES USED BY MAJOR GAS COMPANY TO KEEP TOWN "ON STREAM"

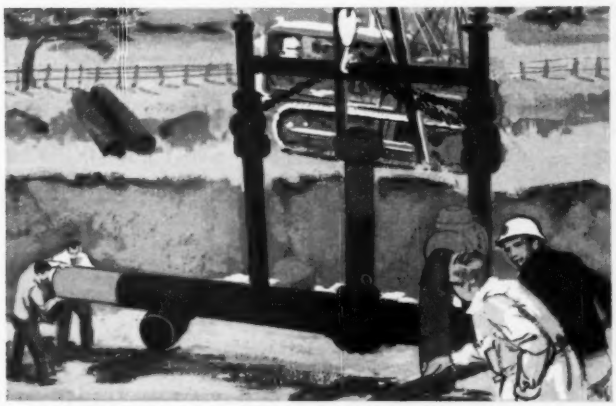


❶ "Our problem is to install a block valve and swaged tee on our 16" main without shutdown. This is possible with WmSon Tapping and Stopple equipment."

❷ "We made two 16" Stopple taps and two 8" by-pass taps with a WmSon-Hillco Tapping Machine through WmSon Sandwich Tapping Valves. These valves are temporary and are bolted to split tees which were welded on the line."



❸ "This Stopple plugging machine and the other one down the line were placed on the 16" Sandwich Tapping Valves and sealing elements were positioned inside the main line. The flow was then completely diverted through the by-pass."



❹ "We removed the isolated section of line and, now, we lower the new section into place. When this new section is welded, Stopples are removed, Lock-O-Ring plugs are installed and tapping valves recovered. The entire job is done without shutdown or loss of pressure."

❺ "This job is typical of Stopple jobs which are taking place in pipeline, plant and refining operations here and abroad. WmSon Tapping and Stopple equipment is available for purchase or rental."

T.D. Williamson, Inc.
P. O. BOX 40 • TULSA 2, OKLAHOMA

REPRESENTATIVES AROUND THE WORLD

PIONEERS OF PIPELINE EQUIPMENT

Commission modifies decision

FPC has modified the "1960 construction" phase of a presiding examiner's decision in Transcontinental Gas Pipe Line Corp.'s $53.3 million project (Dockets G-16603 et al).

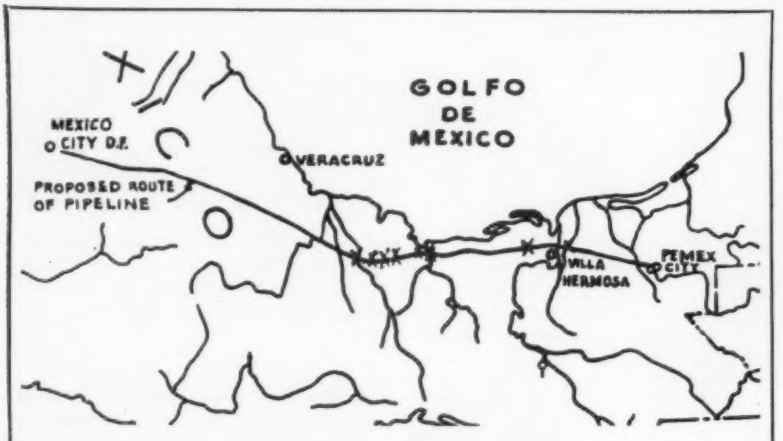
Presiding Examiner Ivins, and the FPC, took action enabling Transco to increase firm deliveries to 44 existing resale customers by a total of 138.5 MMcfd.

The examiner's decision, however, authorized only those facilities proposed under Transco's so-called "1959 construction." He denied the company's proposed "1960 construction" because it involved facilities concerned with the so-called "X-20" transportation service for Consolidated Edison of New York. This service was originally denied by the FPC last January. However, early in November, the U. S. Third Circuit Court of Appeals reversed that action and remanded the case to the FPC. In view of the November action, and because of the chance of further court proceedings in the case, the FPC believes it would be best to grant a motion by Con Edison. This motion calls for severing and deferring action on the "1960 construction" until final disposition of X-20.

The FPC also deleted from the examiner's decision a condition requiring Transco to show that it has improved its gas supply situation before filing any future certificate applications. The commission pointed out that this condition was satisfied by a filing made by Transco last September.

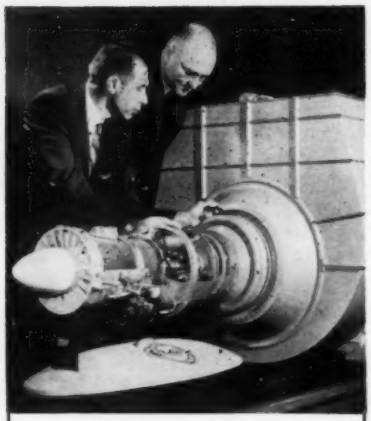
Sales doubled

Trans-Canada Pipe Lines Ltd. is delivering 45 MMcfd to Ontario Natural Gas Storage & Pipe Lines Ltd., wholly owned subsidiary of Union Gas Co. of Canada Ltd. The companies have a long-term sales-purchase contract. T/C president, James W. Kerr, said, "With the start of these deliveries, Trans-Canada has doubled its . . . sales in one full year of operation. Our sales to distributor customers from Saskatchewan to Montreal . . . have reached . . . 300 MMcf daily."



South of the border

Eight river crossings have to be made along the longest pipeline ever built in Mexico. Contractors for the crossings are Collins Construction Co. of Port Lavaca, Texas, and Constructora Inde S.A. de C.V. of Mexico City. The dual 24-in. and 12-in. water crossings are part of the 491-mile, 24-in. line for Petroleos Mexicanos. Experts say the crossings will be some of the toughest in the world. Rainy season is the third heaviest in the world. Rivers are known to overflow their banks as much as 10 miles on either side. One crossing, the Grijalva, is the 7th largest river system in the world.



Jet age

A one-quarter scale model of the experimental 10,500-hp jet-driven gas turbine was shown during the recent API meeting in Chicago. Developed by Cooper-Bessemer, the gas turbine is powered by a Pratt & Whitney Aircraft jet engine, based on the famous J-57 and modified to use natural gas as fuel. First installation is planned for early this year at a Kentucky compressor station of Columbia-Gulf Transmission Co. The 10,500-hp unit will drive a large C-B centrifugal pipeline booster.

Makes appointments

Several new representatives have been named by Burgess-Manning Co.'s industrial silencer division. They are: Barth Engineering Co., Oakland, Calif., covering northern California and most of Nevada; E. N. Murray Co., Denver, covering Colorado, Utah, Wyoming, Montana, Idaho, parts of North Dakota and Nebraska; Adams Engineering Co., Decatur, Ga., covering Georgia and part of South Carolina; and Carlson - Rutledge Co., Cleveland, covering northeastern Ohio.

Cascade expanding

Consumers Gas Co. of Bend, Ore., is being merged with Cascade Natural Gas Corp., Seattle, Wash. Although approved by company directors, the merger awaits approval of Washington and Oregon regulatory bodies and company stockholders.

Cascade will be the surviving corporation. Nick Hollamon, president of Consumers, will become district manager of the Bend operations.

Contractors at work on Transwestern

CONTRACTS have been let and construction is under way on Transwestern Pipeline's 1805-mile line, destined to deliver gas from Texas and Oklahoma fields to the California border.

Joint contract is held by Houston Contracting Co. and H. C. Price Co. for the 30-, 24-, and 20-in. line.

Houston will build some 597 miles as follows: 149 miles of 30-in. from Corona, N. M. west to McCartys, N. M.; 55 miles of 30- and 89 miles of 24-in. from Corona, N. M. east to Roswell, N. M. and southeast to Carlsbad; 61 miles of 20- and 76 miles of 24-in. from Fort Stockton, Texas, northwest to Carlsbad; 166 miles of 24-in. from Roswell northeast to Dawn, Texas; and 300 miles of 16-, 12-, and 10-in. trunk laterals in the Texas-Oklahoma panhandle and West Texas-New Mexico area.

Two H. C. Price spreads are building 335 miles of 30-in. pipe across the state of Arizona. Two Price - O - Matic automatic welding racks are set up in double-jointing yards at Gallup, N. M. and Kingman, Ariz. There, 40-ft sections will be double-jointed into 80-ft lengths for use on Price's section of the $192 million line.

Cooper-Bessemer Corp., Mt. Vernon, Ohio, has an order from Transwestern for 10 of its engines and centrifugal compressors.

The gas engines are turbocharged Type LSV-16 cylinder units. The Type RFB-24 centrifugals are direct driven by the LSV engines through speed increasers.

The new line will be automatically controlled from one remote point. Initially, the system will be comprised of five mainline stations, each having two of the C-B units.

El Paso-PNW merger approved

THE long-pending merger of Pacific Northwest Pipeline Corp. into El Paso Natural Gas Co. has been approved by an FPC presiding examiner.

El Paso, serving certain areas in Arizona, California, Nevada, New Mexico, and Texas, acquired 99.8 per cent of Pacific's common stock in 1957. Pacific's system extends from the San Juan basin in New Mexico through Colorado, Utah, Wyoming, Idaho, Oregon and Washington to the U. S.-Canadian border. Its gas supplies come from both U. S. and Canadian sources, including the Rocky Mountain area.

The attachment of these reserves to El Paso's expanding system "definitely is in the public interest," Presiding Examiner Kelly said.

In July 1957, the U. S. Attorney General charged the companies with violation of the Clayton Act. The District Court in Utah, slated to hear the case, postponed the trial pending final FPC action on the proposed merger. El Paso's acquisition of PNW's stock was charged to be in violation of the Clayton Act because the effect would be to lessen competition and tend to create a monopoly.

Examiner Kelly pointed to a 1950 amendment to the Clayton Act. This made its prohibitions inapplicable to transactions approved by FPC. He said that the continuing power of the commission to regulate and supervise gas companies constitutes "a protective shield against the evils of monopoly." The action in postponing the trial, he said, showed that FPC should have first opportunity to examine the transaction.

Examiner Kelly said the important competition to be considered was in two fields: the market and producing areas.

Prior to the stock deal, he said, there was no actual or potential competition between the two, except for the California market. And, Pacific did not have the financial capacity to compete seriously there. He said that California is El Paso's main market and that the company will find future competition "keener" in this "prize" area. He mentioned the two other companies after the California market: Transwestern Pipeline, which is already under construction; and Alberta & Southern (Pacific Gas & Electric affiliate), seeking to bring Canadian gas to California.

Kelly also said that the elimination of Pacific Northwest as a competitor for the purchase of gas "is not of great consequence when there remain other strong competitors for gas in all producing fields to which the unified company will have access."

Plans processing plant

Ohio Oil Co. plans a natural gas processing plant to serve the Scipio, Pulaski, and Albion fields of south Central Michigan. Set for mid-1960 completion, the plant will have a capacity of 25 MMcfd.

FPC changes docketing procedure

Beginning this month, the FPC has a new method of assigning docket numbers to natural gas proceedings. The new method will show both the type of case and the fiscal year in which it was initiated.

Four different two-letter prefixes will be used to show the type of case. The prefix will be followed by the last two digits of the fiscal year, then a dash, and finally a serial number for each type of case, beginning with "1" on Jan. 1, and on each ensuing July 1.

On all gas cases other than rates or accounting, the prefix "CP" will be used for pipeline companies and "CI" for independent producers. The prefix "RP" will be used for pipelines and "RI" for producers on rate or accounting cases.

Pipeline noise study issued

A study of gas pipeline noise abatement is presented in the first volume of a three-part handbook published by the AGA's pipeline research committee.

Volume I is an introduction to the physiological, psychological and legal aspects of noise at pipeline installations. Volumes II and III, slated for publication this year, will cover field aspects of the association's noise abatement research program.

Copies are available at $1.50 each from the AGA, 420 Lexington Ave., New York 17.

Transco plans $51.7 million program

Transcontinental Gas Pipe Line Corp.'s 1960 construction plans, filed recently with the FPC, involve $51.7 million. New facilities will increase service by 108.8 MMcfd to 32 existing customers.

When this plan is approved, and combined with certain other allocations pending, Transco's total peak day allocations will reach 1,423,841,000 cu ft—exclusive of storage. With storage, the total is 1,764,293,000 cu ft.

Also included in 1960's plans are $23 million of added construction in connection with the proposed 50 MMcfd transportation service for Consolidated Edison Co. of New York.

Construction cash requirements for these projects, facilities now under way, and those authorized but on which construction has not yet begun, are expected to total about $107 million.

Construction covered in the latest filing includes 280 miles of big-inch line paralleling existing trunk lines. Of this, 211 miles will be 36-in. and 69 miles 30-in. Each end of these loops will connect back into the dual mainlines. In most areas, the new loops will constitute a third parallel line in the Transco system between the Gulf Coast and New York City. Also included are additional compressor units at 9 existing stations, totaling 32,040 hp.

Plans more gas for Chicago area

Natural Gas Pipeline Co. of America is seeking FPC approval of a new plan to increase gas supplies in the Chicago area.

Under the $31.1 million plan, NGPL's peak day delivery capacity would be increased by 100 MMcf—to 830 MMcf. Customer utility companies in the Chicago area would get the gas. Peoples Gas would receive about 40 MMcf.

Major portion of the project involves 151 miles of 36-in. line in intermittent sections paralleling mainline facilities between Ford county, Kan. and Joliet, Ill. A new 180-mile 24-in. line is planned between existing facilities near Minneola, Kan. and Kiowa county, Okla. Also called for are metering and regulating facilities at Joliet.

The new line would give Natural access to areas with proved and potential gas reserves believed to be of considerable magnitude. Gas supplies for the proposed expansion were secured under long-term contracts.

NGPL gets new gas supply

Seven applications involving sales from two Oklahoma fields to Natural Gas Pipeline Co. of America have been okayed by an FPC presiding examiner (Dockets G-16911 et al).

The decision authorizes five independent producers to sell gas to Cimarron Transmission Co. In turn, Cimarron was told to sell the gas to NGPL. Natural will build 29 miles of 10-in. line to take the gas into its system.

Proved reserves in the fields total about 90.3 billion cu ft. Based on a 20-year depletion, the examiner said it was estimated that a daily average volume of 12.3 MMcf could be maintained for 17 years, with declining deliverabilities thereafter.

Oil facts published

The centennial edition of "Petroleum Facts and Figures" has been published by the American Petroleum Institute. The 475-page volume provides a comprehensive statistical history of the 100-year-old oil industry. It includes data on production, refining, transportation, marketing and utilization.

More information on the book is available from the API, 50 W. 50th St., New York 20.

Looping okayed

Columbia Gulf Transmission Co.'s 41.1-mile 24-in. looping job has FPC approval (Docket G-18836). The $3.9 million line will run from the company's Erath junction in Vermillion parish, La., to a junction with its 12-in. Lake Sand gathering line in St. Mary parish, La.

FPC hopes to shorten and speed proceedings

New rules, effective this month, are expected to speed up proceedings and shorten hearings before the FPC. Principally, amendments call for wider use of conference procedures both prior to and during hearings.

FPC believes use of the conference offers opportunities for significant success in its efforts to reduce some retarding influences which have slowed cases in the past.

Ultimate purpose of the conference is to shorten the period between the time hearings are initiated and final orders are issued.

Okay stock exchange plan

Stockholders of Texas Illinois Natural Gas Pipeline Co. approved a stock-exchanging plan with Peoples Gas Light & Coke Co. Texas Illinois common stockholders will receive one share of Peoples Gas' capital stock in exchange for each two shares of Texas Illinois common.

Under the plan, the net assets of Texas Illinois would be transferred to Peoples Gulf Coast Natural Gas Pipeline Co., a new Peoples Gas subsidiary. Texas Illinois would be liquidated.

Wrapping plant expands

New production facilities have been opened in Houston by Plicoflex Inc. The plant is currently being used to produce corrosion resistant pipeline wrapping tape. Future plans call for production of a wide variety of plastic goods. The plant building has about 40,000 sq ft of space.

Delivery ordered

Mississippi River Fuel Corp., St. Louis, has been ordered to deliver gas for ultimate distribution in an area adjacent to Crossett, Ark. (Docket G-17942).

The order covers up to 374 Mcfd to Natural Gas Improvement District No. 2 of Ashley county, Ark. Mississippi's ability to transport gas north of its Crossett compressor station is limited. Therefore, it has gas in excess of the 374 Mcf requested by the district, according to FPC. Mississippi did not oppose the request.

TGT's offer accepted

Tennessee Gas Transmission Co.'s stock exchange offer has been accepted by more than 80 per cent of the holders of East Tennessee Natural Gas Co.'s shares. This is enough to enable Tennessee Gas to make effective its offer of one of its common shares for each 2¾ East Tennessee shares.

Rate case dismissed

A decision, subject to review by the commission, has dismissed "for lack of jurisdiction" three rate increases proposed by Pure Oil Co. for gas sold to El Paso Natural Gas Co. (Docket G-17930).

The decision concludes that the increases, based on favored-nation contract provisions, were not "triggered" by El Paso's purchase of gas from another company at a higher price.

Westcoast has new supply

A new British Columbia gas area has been connected to the Westcoast Transmission Co. Ltd. system. The field is about 50 miles north and west of Fort St. John, B. C. Pacific Petroleums Ltd., developer of the field, reported initial deliveries at 12 MMcfd. These were increased after the first month of operation to an estimated 50 MMcfd.

CIG station approved

Colorado Interstate Gas Co. has FPC approval of a new 2000-hp compressor station and 7 miles of 18-in. line (Docket G-19394). Cost: $1.1 million. The facilities, to be built in Hutchinson county, Texas, will enable CIG to receive about 20 MMcfd produced in the Panhandle field by J. M. Huber Corp.

Plans added compression

Mississippi River Fuel Corp., St. Louis wants to install 5000-hp compression in the Woodlawn field of Harrison county, Texas (Docket G-19495). Already installed there are seven field compressors totaling about 1650 hp.

Gas delivery unopposed

Texas Gas Transmission Corp. has been ordered to deliver up to 2.7 MMcfd to Indiana Natural Gas Corp., Bedford, Ind. (Docket G-17564). Gas will be resold in the Indiana towns of Orleans and Paoli. Texas Gas did not oppose the request for service.

GAS Pipeline People

J. W. CARNEAL has been appointed executive assistant to the vice president in charge of employee relations and land and lease for Texas Gas Transmission Corp., Owensboro, Ky. Last Jan. 1, Carneal was named director of sales and industrial development. He will retain his responsibilities in that area.

ALBERT T. C. RUTGERS is Northern Natural Gas Co.'s gas supply and reserves representative for western Canada. He replaces W. E. AINSWORTH as head of Northern's Calgary office.

HOWARD KEIR has been named plant superintendent of Southern Counties Gas Co.'s general pipeline district, headquartered in Ventura, Calif. He replaces the late T. C. WALLACE. Keir formerly was assistant plant superintendent.

Three new directors were elected to the Texoma Production Co. board recently. They are F. P. BURNS, vice president; C. E. HOLMES, vice president; and REMICK MCDOWELL, president-elect of the parent firm, Peoples Gas Light & Coke Co. Burns also was named to the board of another Peoples Gas subsidiary, Peoples Production Co.

HULETTE F. ABY, formerly general counsel to Middle States Petroleum Corp., has been named associate general attorney for Tennessee Gas Transmission Co., Houston.

WILLIAM I. BALLENTINE JR. is chief engineer for the Southern Pipe Division of U. S. Industries Inc., Azusa, Calif. Ballentine joins Southern Pipe after 10 years with U. S. Steel's Consolidated Western Steel Division. There he served as manager of research and development and as general supervisor of research and development services.

PAUL D. WILLIAMS has been named manager of marketing administration for General Electric Communication products department's national headquarters in Lynchburg, Va.

REX W. LANDRY has joined Daniel Orifice Fitting Co., Houston, as application engineer in charge of meter station design. While with Ford, Bacon & Davis Inc., Landry worked on projects for Southern Natural Gas Co., Michigan-Wisconsin Pipe Line Co., as well as Inland Natural Gas Co. Ltd. in Canada.

J. W. Carneal
Texas Gas

W. I. Ballentine
Southern Pipe

JOHN W. MARTIN is project manager of Pittsburgh (Pa.) Coke & Chemical Co.'s commercial development department.

L. B. KRUMM is Detroit district manager for the Bristol Co., Waterbury, Conn. He has been a sales engineer for Bristol's New York district since joining the company in 1953.

DR. SCOTT W. WALKER has been named dean of the College of Petroleum Sciences and Engineering at the University of Tulsa. Walker is assistant manager of research for Pan American Petroleum Corp. and for six years was a faculty member at Massachusetts Institute of Technology.

Tube Turns Division of Chemetron Corp., Louisville, Ky., has made a series of promotions. JAMES M. GLOOR is now works manager, freeing JOHN A. HENBY, vice president-production, for new responsibilities related to current and future manufacturing operations. MORRY T. WAKEFIELD succeeds Gloor as production superintendent; MAX B. DENSFORD succeeds Wakefield as personnel manager; HENRY H. GEORGE is chief engineer, product engineering and research department. EVERETT C. RODABAUGH, principal research engineer, has added duties as head of the newly formed process research group; and FRED C. SMITH, director of quality control, has added duties as special research project head.

EDWIN M. HINSDALE has been made chief engineer, RCA communications products department of Radio Corp. of America.

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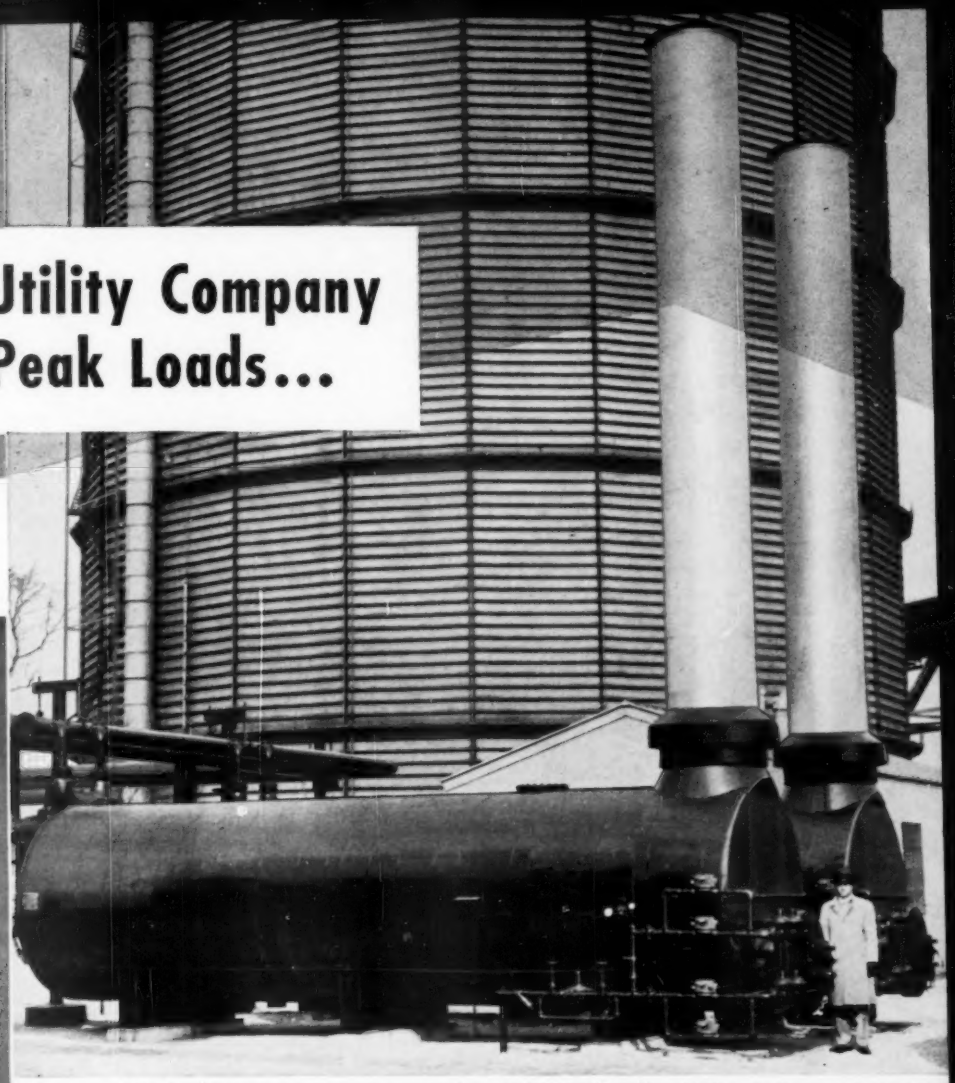
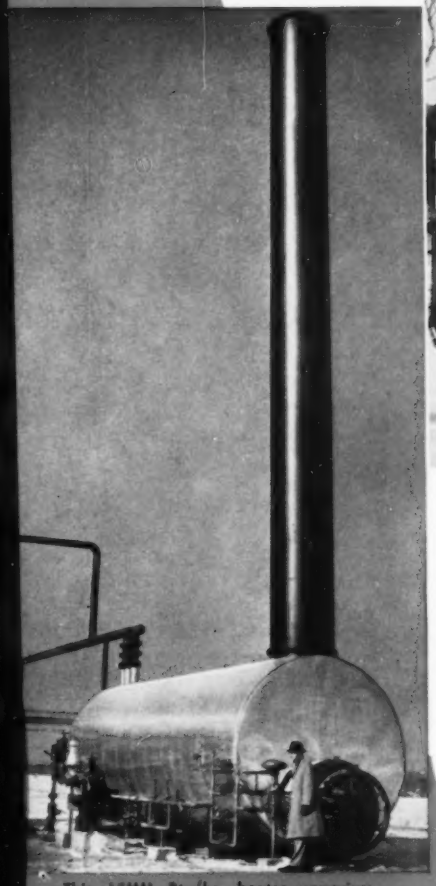
This Gas Utility Company Shaves Peak Loads...



These two 10MM Btu/hr. heaters will vaporize approximately 10,000 gallons/hr. of LPG each. They are fired with natural gas, and are tied in with the complete automatic controls for mixing LPG, air and natural gas.



This 15MM Btu/hr. heater vaporizes approximately 15,000 gallons/hr. of LPG.

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*Name supplied on request.

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